



**Water Management Act
Well Water Withdrawal
Permit Application**

**MA DEP and USEPA
Wastewater Discharge
Permit Application**

Chang Farms, Inc

415 River Road
South Deerfield, MA 01373
413 665 3341

Prepared by

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APPLICATIONS

MA DEP Water Management Act - Well Water Withdrawal
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1.0 Regulatory Requirements

Chang Farms is required under the MA Water Management Act to obtain permits for water withdrawal above a normal daily use of 100,000 GPD. As per the Consent Order, this is the application package for that permit.

Also, the Farm is required to obtain a permit for waste disposal in accordance with the latest rules and regulations. Based on the wastewater quantity, site topography, and other considerations, the wastewater disposal permit will be a NPDES permit for discharge directly to the Connecticut River. A discharge permit application is also required by the Consent Order. This is also the application package for the NPDES permit.

JUL 12 2004

2.0 Operations

Chang Farms (The Farm) is a family run agricultural enterprise that produces bean sprouts in different varieties for the retail market. The sprouts are grown, packaged and shipped from the facility in Whatley, MA. The business success is due in part to the availability of the water resource from shallow wells and the discharge of the spent water to the Connecticut River. Resorting to a city water supply and/or to a municipal sewerage system disposal would significantly diminish the viability of this enterprise.

The Farm purchases the beans in bagged lots from various brokers. The process begins by soaking the beans in tepid water to ready the bean for germination. Following this, the beans are placed in growing cells that are approximately 6 foot cubed and have two layers per cell. The beans germinate in the cells and produce a dense mass of sprouts in 3 to 5 days. During the growth, the beans are periodically irrigated with tempered well water to insure adequate moisture for growth. The irrigation water is dosed with nutrients to enhance the growth. A list of nutrients and the source is provided in the Appendix.

As the growing cells are not sterile, they provide conditions where bacteria thrive. The bacteria, generally, are not biologically dependent on the sprouts but can become assimilated in time if allowed to remain in the system. This potential of assimilation makes recycling of the irrigation water unfeasible. In order to recycle the water, it would have to be disinfected to a high level. Recycling and thus disinfection is not an industry standard and is not commonly utilized. Also, the presence of the bacteria creates a need to sanitize the equipment after each growth cycle.

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The sprouts once removed from the cells are cleaned, separated and packaged for market. This work is done from 11 PM to 3 AM such that the sprouts are delivered to market within 4 to 5 hours. This process involves washing of the sprouts plus cleaning of the equipment at the end of the shift.

The operation is stable over a year and is not seasonal to any large extent. The market is expected to blossom as people continue to the trend to improved diets.

In summary, water is utilized in the process as follows:

Irrigation Uses

Presoak the beans at a controlled temperature	7 AM to 11 AM
Irrigate the cells for sprout growth	Continuous
Sanitize the growth equipment and cells	11 PM to 3 AM

Production

Wash the product for market	11 PM to 3 AM
Sanitize the process and packing equipment	3 PM to 6 AM

A process flow diagram is provided to depict the water uses graphically.

3.0 Site Location and Topography

The Farm is located in the northeast corner of the Town of Whatley, MA on River Road. The Town is generally agricultural and regarded as rural. The Farm is sewerage. The property is owned by the President and Vice President and consists of three parcels of 45, 23 and 5 acres. The later two parcels being bounded on the east by the Connecticut River and on the west by River Road. The larger parcel is located west of River Road. Only the buildings on the westerly parcel are used for the bean sprout production. The remaining lands are used to raise agricultural crops for restaurant use or rented to other farmers. The agricultural lands of the Owner and neighboring farms are not irrigated with ground water.

The two parcels to the east of River Road can not be developed as the rights to development have been sold to Massachusetts. As such, the land will remain as agricultural land. Consequently, there is no foreseeable potential to further use the ground water east of the production facilities.

The general area slopes from the highlands to the River from west to east. The highlands would provide a major portion of the recharge area for the ground water at the Farm.

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Below the highlands are two plains, which were the River bottom in past ages. These plains have a sandy, silty soil which overlays a clay zone. The clay zone is known to be impervious and the ground water flows along the top of the clay to the River.

The proposed outfall pipe would cross the Sugarloaf Brook and the bank of the Connecticut River. If open cut trenching is used, plans and mitigating environmental protections would be submitted to the Town of Whatley Conservation Commission for their review and approval. The use of directional boring is being investigated as a means of crossing the Sugarloaf Brook and down the River bank. If this is used the Conservation Commission will be advised of the plans and their comments requested.

4.0 Water Sources and Alternates

Domestic water for the Farm and the surrounding community is supplied by the Town of Whatley from a water main in River Road. The only other known well is a neighboring farmer who uses approximately 8 GPM of ground water to wash product. There is no crop irrigation from the ground water, either deep well or shallow.

Use of Town water is not viable for the process irrigation or production as the Town is not able to supply the quantities necessary. Also, a connection to the Town of Deerfield was investigated and again the Town of Deerfield does not have adequate capacity. As noted a deep rock well was drilled but was not able to produce either the quantity or the quality necessary for the operation.

5.0 Process Wastewater Disposal

The current plan is to pipe the wastes to the Connecticut River. A permit for this is being attached. The plan is to pipe the waste directly to the River across the Farm. A second alternate investigated was to pipe the wastes to the Town of Deerfield Water Pollution Control facility and use this outfall. This alternate is not politically viable due to the agreements necessary to achieve the use of the outfall. Land application is not viable due to the winter conditions for spraying and the need for storage. The cost of subsurface piping is not viable and again storage would be required and would have a direct impact on the well water quality.

why?

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6.0 Domestic Water Sources and Disposal

Water for the residence and other domestic uses is from a Town of Whatley water main in the road. Domestic water is disposed via a septic tank and leaching field as shown on the site plan.

7.0 Well Water Withdrawal

The Farm has twelve wells (11 working) that they draw most of the irrigation water from and two wells for the production water. The wells are 1 1/4" pipe hand driven to about 25 to 30 feet to refusal. Refusal is representative of the top of the clay strata that underlies the site. The well point is a wedge wire with a 0.020 inch horizontal slot and is 24 inches long.

Each well has a self-priming, suction lift pump. The pumps are Goulds Model GT 153 with a 1 hp 240V 3 phase motor. The pumps are rated at 30 gpm at 112 Feet of TDH. The pumps are mounted in a 4 foot dia manhole about 7 feet below grade.

The irrigation water wells are divided into two banks of 6 with each bank of pumps feeding a 3 inch main that flows to the building as shown on the Process Flow Diagram.

The wells are used to fill a 12,000 gallon storage tank. The pumps are started automatically from float switches in the storage tank. Each bank of 6 pumps starts alternately to even the pump wear and to allow the ground water to refill the draw down during the off cycle. The raw water temperature is raised using the wastewater as a heat source in a shell and tube heat exchanger. From the storage tank, the water is heater further, stored again and then pumped to its use point.

Nutrients are added to the well water where it is used in the growing rooms as irrigation water. These are noted in the appendices.

The two production wells pump to small storage tank and the water is pumped a second time to its use in the production area. This water is not tempered or heated. Cleaning agents are used during the cleaning process which are listed in the appendices.

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8.0 Well Water Quality

The well has been tested for drinking water parameters over the past years. The results of the tests are included in Appendix B. The test data has been reviewed by the FDA representative who periodically visits the site.

9.0 Well Test 13 June 2004

On Sunday 13 June at 9 AM to Monday 14 June 9 AM, a flow test was run on the twelve wells. During the test, 22 of the 24 pumps were run for the duration. One pump was not pumping and was shut down. The pumps produced a continuous flow of 125 to 132 GPM. The suction gauges on the pumps were monitored every $\frac{1}{2}$ at the start then every hour then every 6 hours. The vacuum gauge suction did not vary at each of the pumps and was between 15 to 22 inches of HG (24 feet TDH or 10.4 psi). The steady gauge suction indicated that the pump performance was not perceptibly affected by the draw down.

The draw down of the groundwater as measured at the test well was approximately $\frac{1}{2}$ " per hour or 0.04 feet per hour with a total of 1 foot. The recovery when the well pumps were shut off was about 40 minutes.

Consequently, the wells are not capable of a sustained flow of 130 GPM (187,200 GPD). Based on the test, a project maximum day would likely be above 120 GPM based on the fact that the water use for irrigation is approximately half of the peak flow, which is irrigation plus production water. The well test thus represented a peak flow condition, which is not likely to occur.

10.0 Wastewater Flow and Quality

The wastewater flow is derived completely from the wells. There is no water removed from the site in the product. Appendix B includes laboratory reports for recent data collected for the current discharge as required by the Consent Order. The data indicates that the wastes are very benign. The only elevated constituents were nitrates, which are elevated due to well water, and fecal coliform.

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The plant has two water closets and they drain to a septic tank and leaching system down gradient of the wells. The plant has been dye tested for cross connections and none have been located. Further testing with stronger dye will be completed. The fecal coliform source is likely from the workers boots who spread waste product and trimmings back onto the agricultural to the west of the plant. Bean rinsing is also likely a strong contributor towards the elevated fecal coliform counts.

To address fecal coliform, Chang Farms plans to thoroughly sanitize the Plant and initiate a program of changing footwear. In addition wastewater generated from bean soaking and rinsing will be isolated from the existing process, and disinfected prior to its discharge.

11.0 Conclusions and Permit Request

The requested flows are based on use of current wells. Further development will require additional wells on the east side of the road. Permit applications will be submitted and well tests performed when additional water is required.

As was shown in the Narrative, the ground flows generally west to east to the Connecticut River. There are no water uses or potential water uses between the well site and the River. Consequently, there are no adverse impacts from the permit request quantity for shallow well water withdrawal.


As noted, the wastewater flow to the River will the same as the water withdrawal.

Current daily flow rate (averaged over 30 days)	120,000 GPD (83.3 GPM)
Current peak flow (based on six pumps)	130,000 GPD (90.3 GPM)


Requested Permit daily flow	150,000 GPD (104.2 GPM)
Requested peak flow (more than 6 pumps)	180,000 GPD (125 GPM)

END OF NARRATIVE

USEPA NPDES for discharge to Connecticut River

FORM 1 GENERAL		U.S. ENVIRONMENTAL PROTECTION AGENCY GENERAL INFORMATION <i>Consolidated Permits Program</i> <i>(Read the "General Instructions" before starting.)</i>	I. EPA I.D. NUMBER <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:5%; text-align: center;">S</td> <td style="width:75%;"></td> <td style="width:10%; text-align: center;">T/A</td> <td style="width:10%; text-align: center;">c</td> </tr> <tr> <td style="text-align: center;">F</td> <td></td> <td></td> <td style="text-align: center;">D</td> </tr> </table>	S		T/A	c	F			D
S		T/A	c								
F			D								
LABEL ITEMS II. EPA I.D. NUMBER III. FACILITY NAME V. FACILITY MAILING ADDRESS VI. FACILITY LOCATION		PLEASE PLACE LABEL IN THIS SPACE									
		GENERAL INSTRUCTIONS If a preprinted label has been provided, affix in the designated space. Review the information carefully. If any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent (the area to the left of the label space lists the information that should appear), please provide it in the proper fill-in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, VI (except VI-B which must be completed regardless). Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.									
II. POLLUTANT CHARACTERISTICS INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.											
SPECIFIC QUESTIONS		MARK 'X'	SPECIFIC QUESTIONS								
		YES NO FORM ATTACHED									
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	B. Does or will this facility (either existing or proposed) include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)								
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)		<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	D. Is this a proposed facility (other than those described in A or B above) which will result in a discharge to waters of the U.S.? (FORM 2D)								
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)								
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel or recovery of geothermal energy? (FORM 4)								
Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)								
III. NAME OF FACILITY C 1 Chang Farms, Inc											
IV. FACILITY CONTACT A. NAME & TITLE (last, first & title) C 2 Chang, Sidney Vice President B. PHONE (area code & no.) 4136653341											
V. FACILITY MAILING ADDRESS A. STREET OR P.O. BOX C 3 415 River Road B. CITY OR TOWN C 4 South Deerfield C. STATE MA D. ZIP CODE 01373											
VI. FACILITY LOCATION A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER C 5 415 River Road B. COUNTY NAME Franklin C. CITY OR TOWN C 6 Whatley D. STATE MA E. ZIP CODE 01373 F. COUNTY CODE (if known)											

VII. SIC CODES (4-digit, in order of priority)			
A. FIRST		B. SECOND	
0182	(specify) Bean Sprouts grow under cover	C 7	(specify)
C. THIRD		D. FOURTH	
C 7	(specify)	C 7	(specify)
VIII. OPERATOR INFORMATION			
A. NAME			B. Is the name listed in Item VIII-A also the owner?
C 8	Sidney Chang, Chang Farms		Yes
C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)			D. PHONE (area code & no.)
F=FEDERAL S=STATE P=PRIVATE	M=PUBLIC (other than federal or state) O=OTHER (specify)	P (specify)	C A 4136653341
E. STREET OR P.O. BOX			
415 River Road			
F. CITY OR TOWN		G. STATE	H. ZIP CODE
C 6	South Deerfield	MA	01373
			IX. INDIAN LAND
			Is the facility located on Indian lands? No
X. EXISTING ENVIRONMENTAL PERMITS			
A. NPDES (Discharges to Surface Water)		D. PSD (Air Emissions from Proposed Sources)	
C T I 9 N		C T I 9 P	
B. UIC (Underground Injection of Fluids)		E. OTHER	
C T I 9 U		C T I 9	(specify)
C. RCRA (Hazardous Wastes)		E. OTHER	
C T I 9 U		C T I 9	(specify)
XI. MAP			
<p>Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers, and other surface water bodies in the map area. See instructions for precise requirements.</p>			
XII. NATURE OF BUSINESS (provide a brief description)			
<p>The firm is an agricultural enterprise that grows, harvests, washes and ships fresh bean sprouts to a retail market. The growing operation is continuous and the market delivery is 6 days per week.</p>			
XIII. CERTIFICATION (see			
<p>I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.</p>			
A. NAME & OFFICIAL TITLE (type or print)		B. SIGNATURE	C. DATE SIGNED
Sidney Chang Vice President			
COMMENTS FOR OFFICIAL USE ONLY			

FORM C NPDES		U.S. ENVIRONMENTAL PROTECTION AGENCY APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER EXISTING MANUFACTURING, COMMERCIAL, MINING AND SILVICULTURAL OPERATIONS Consolidated Permits Program
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I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER (list)	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER (name)
	1. DEG	2. MIN	3. SEC	1. DEG	2. MIN	3. SEC	
001	42.00	27.00	40.00	72.00	35.00	43.00	Connecticut River

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing of water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g. for certain mining activities), provide a pictorial description of the nature and amount of any sources of water and any collection of treatment measures.

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NUMBER (list)	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT	
	a. OPERATION (list)	b. AVERAGE FLOW (include units)	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1
001	Crop Irrigation	55 gpm	Static Screen	1-T
	Crop Washing and Packaging	40 gpm	Discharge to Connecticut River	4-A
	Bean Preparation	14 gpm		

OFFICIAL USE ONLY (effluent guidelines sub-categories)

↓
Total = 157,000 GPD

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES (cont.)

Except for storm runoff, leaks, or spills, are any of the discharges described in Items II -A or -B intermittent or seasonal?

☐ YES (complete the following table)

☒ NO (go to Section III)

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES (complete Item III-B)

☒ NO (go to Section IV)

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measure of production)?

☐ YES (complete Item III-C)

☐ NO (go to Section IV)

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guideline, and indicate the affected outfalls.

IV. IMPROVEMENTS

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☒ YES (complete the following table)

☐ NO (go to Item IV-B)

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC.	2. AFFECTED OUTFALLS (list no.)	3. BRIEF DESCRIPTION OF PROJECT.	4. FINAL COMPLIANCE DATE.	
			A. REQUIRED	B. PROJECTED
Application for Well Withdrawal Permit		Provide MA DEP with completed application forms.	7/1/2004	7/1/2004
Application for NPDES permit		Submit a completed NPDES permit for the waste discharges.	6/29/2004	6/29/2004

IV. IMPROVEMENTS (cont.)

B. OPTIONAL: You may attach additional sheets describing any additional water pollution control programs or other environmental projects which may affect your discharges (including pollution prevention programs) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction.

☒ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

1. PROJECT DESCRIPTION	2. PROJECT SCHEDULE	3. PROJECT UNDERWAY?
Construct outfall 001	Construction to begin 120 days after approval of the NPDES permit	No, project is planned

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding - Complete one set of tables for each outfall - Annotate the outfall number in the space provided.

NOTE: Tables V-A, V-B, and V-C are included on separate sheets.

D. Use the space below to list any of the pollutants listed in Table 2C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an immediate or final product or byproduct?

☐ YES (list all pollutants below)

☒ NO (go to Item VI-B)

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES (Identify the test(s) and their purposes below) ☒ NO (go to Item VIII)

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analyses reported in Item V performed by a contract laboratory or consulting firm?

☒ YES (list the name, address, and telephone number of, pollutants analyzed by, each such laboratory or firm below)

☐ NO (go to Item VI-B)

A. NAME	B. ADDRESS	C. TELEPHONE (area code & no.)	D. POLLUTANTS ANALYZED (list)
Severn Trent Laboratory	53 South Hampton Road Westfield MA 01085	(413) 572-4000	Total and fecal coliform, TSS, BOD, NO3-N, NO2-N, Total P, NH3 and TKN

IX. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system of those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

NAME & OFFICIAL TITLE J. Mark Krcmarik Sr Environmental Engineer	B. PHONE NO. (area code & no.) (413) 246-0421
C. SIGNATURE	D. DATE SIGNED

V. INTAKE AND EFFLUENT CHARACTERISTIC

PART B-Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitations guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See instructions for additional details and requirements.

OUTFALL NO. 001

1. POLLUT- ANT AND CAS NO. (if available)	2. MARK "X"		3. EFFLUENT				4. UNITS		5. INTAKE (optional)		
	a. BEL- IEVED PRE- SENT	b. BEL- IEVED AB- SENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAILY VALUE (if available)		c. LONG TERM AVG. VALUE (if available)		d. NO. OF ANAL- YSES	a. CONC- ENTRA- TION	b. MASS
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS			
Bromide (24959-67-9)		X									
Chlorine, Total Residual	X		0.20	0.00	0.18	0.00	0.00	0.00	2.00	milligrams per liter (mg/l)	pounds (lbs)
Color		X									
Fecal Coliform	X		The fecal coliforms have been found in recently. Testing is underway to determine source and then a disinfection process will be instituted. <i>amount?</i>								
Fluoride (16984-48-8)		X									
Nitrate - Nitrate (as N)	X		The nitrate source is from the ground water. The facility uses shallow ground water wells for the irrigation, preparation and wash water.								
Nitrogen, Total Organic (as N)	X		3.60	0.00	3.60	0.00	0.00	0.00	1.00	milligrams per liter (mg/l)	pounds (lbs)
Oil and Grease		X									

CONTINUED FROM PAGE 3 OF FORM 2-C

EPA I.D. NUMBER (copy from Item 1 of Form 1)

V. INTAKE AND EFFLUENT CHARACTERISTIC

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

OUTFALL NO. 001

1. POLLUTANT	2. EFFLUENT										3. UNITS (specify if blank)		4. INTAKE (optional)		
	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAILY VALUE (if available)		c. LONG TERM AVG. VALUE (if available)		d. NO. OF ANAL- YSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVG. VALUE		b. NO. OF ANAL- YSES			
	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS							
a. Biochemical Oxygen Demand (BOD)	13.00	10.70	13.00	10.70	11.50	0.00	7.00	milligrams per liter (mg/l)	pounds (lbs)	0.00	0.00	0.00			
b. Chemical Oxygen Demand (COD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	milligrams per liter (mg/l)	pounds (lbs)	0.00	0.00	0.00			
c. Total Organic Carbon (TOC)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	milligrams per liter (mg/l)	pounds (lbs)	0.00	0.00	0.00			
d. Total Suspended Solids (TSS)	9.00	6.90	9.00	6.90	6.20	0.00	6.00	milligrams per liter (mg/l)	pounds (lbs)	0.00	0.00	0.00			
e. Ammonia (as N)	0.31	0.00	0.12	0.00	0.00	0.00	2.00	milligrams per liter (mg/l)	pounds (lbs)	0.00	0.00	0.00			
f. Flow	VALUE 129,744.0	VALUE 129,744.0	VALUE 129,744.0	VALUE 129,744.0	VALUE 111,600.0	5.00	U.S. gallons per day (gpd)			VALUE 0.00	0.00	0.00			
g. Temperature (winter)	VALUE 18.80	VALUE 18.80	VALUE 17.40	VALUE 17.40	VALUE 0.00	5.00	DEGREES CELSIUS			VALUE 0.00	0.00	0.00			
h. Temperature (summer)	VALUE 18.80	VALUE 18.80	VALUE 17.40	VALUE 17.40	VALUE 0.00	5.00	DEGREES CELSIUS			VALUE 0.00	0.00	0.00			
i. pH	MINIMUM 6.00	MAXIMUM 6.30	MINIMUM 6.00	MAXIMUM 6.30		5.00	STANDARD UNITS								

V. INTAKE AND EFFLUENT CHARACTERISTIC

	X		12.00	0.00	12.00	0.00	0.00	9.60	0.00	6.00	milligrams per liter (mg/l)	pounds (lbs)	0.00	0.00	0.00
Phosphorus (as P), Total (7723-14-0)	X														
Radioactivity		X													
Alpha, Total		X													
Beta, Total		X													
Radium, Total		X													
Radium 226, Total		X													
Sulfate (as SO ₄) (14808-79-8)		X													
Sulfide (as S)		X													
Sulfite (as SO ₃) (14265-45-3)		X													
Surfactants		X													
Aluminum, Total (7429-90-5)		X													
Barium, Total (7440-39-3)		X													

[illegible]

V. INTAKE AND EFFLUENT CHARACTERISTIC

PART C.—If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant if you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2, 4-dinitrophenol, or 2-methyl-4, 6-dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete one table (all 7 pages) for each outfall. See instructions for additional details and requirements.

OUTFALL NO. 001

(1) METALS, CYANIDE, AND TOTAL PHENOLS

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X"			3. EFFLUENT				4. UNITS		5. INTAKE (optional)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAILY VALUE (if available)		c. LONG TERM AVG. VALUE (if available)		d. NO. OF ANALYSES	a. LONG TERM AVERAGE VALUE	b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS		(1) CONCENTRATION	(2) MASS
1M. Antimony, Total (7440-36-0)	X		X									
2M. Arsenic, Total (7440-38-2)	X		X									
3M. Beryllium, Total (7440-41-7)	X		X									
4M. Cadmium, Total (7440-43-9)	X		X									
5M. Chromium, Total (7440-47-3)	X		X									
6M. Copper, Total (7440-50-8)	X		X									
7M. Lead, Total (7439-93-1)	X		X									

V. INTAKE AND EFFLUENT CHARACTERISTIC															
8M. Mercury, Total (7439-97-6)	X														
9M. Nickel, Total (7440-02-0)	X														
10M. Selenium, Total (7782-49-2)	X														
11M. Silver, Total (7440-22-4)	X														
12M. Thallium, Total (7440-28-0)	X														
13M. Zinc, Total (7440-66-6)	X														
14M. Cyanide, Total (57-12-5)	X														
15M. Phenols, Total	X														
2,3,7,8-Tetrachlorodi benzo-P-Dioxin (1764-01-6)															

MA DEP BRP WM06 Permit and Plan Approval for Type I Discharge



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Watershed Permitting Program

**BRP WM 06 – Permit and Plan Approval for
Type I Discharge (Non-Industrial)**

Application for Individual Discharge Permit to Surface
Waters of the Commonwealth

Transmittal Number _____

Date Received _____

A. Facility Information

Important:
When filling out
forms on the
computer, use
only the tab key
to move your
cursor - do not
use the return
key.



1. Name, address, and telephone number of facility producing the discharge

CHANG FARMS, INC

Name

415 RIVER ROAD

Street address

WHATLEY

City

0

State

01373

Zip Code

(413)665-3341

Telephone number (including extension)

E-mail address (optional)

Billing address (if different)

P.O. BOX 191, 415 RIVER ROAD

Street/PO Box

WHATLEY

City

0

State

01373

Zip Code

Discharge Site

415 RIVER ROAD

Street address

WHATELY

City

0

State

01373

Zip Code

Ownership

- ☐ Individual
☒ Corporation
☐ Partnership
☐ Other

If other, please specify:

Status

- ☒ Private
☒ Public
☐ Other

If other, please specify:

2. Contact Person

SIDNEY CHANG

Name

(413)665-3341

Telephone Number (including extension)

VICE PRESIDENT

Title

3. Facility Status:

☒ Existing

☒ Proposed



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Watershed Permitting Program

**BRP WM 06 – Permit and Plan Approval for
Type I Discharge (Non-Industrial)**

**Application for Individual Discharge Permit to Surface
Waters of the Commonwealth**

Transmittal Number _____

Date Received _____

A. Facility Information (continued)

4. Does the project affect a site of historic or archeological significance, as defined in regulations of the Massachusetts Historical Commission, 950 CMR 71.00?

☐ Yes ☒ No

5. Does this project require a filing under 301 CRM 11.00, the Massachusetts Environmental Policy Act?

☒ Yes ☐ No

If yes, has a filing been made?

☐ Yes ☒ No

6. Application Forms Needed

Answer questions A through F to determine which additional application forms you need to submit to the Department of Environmental Protection. If you answer "Yes" to any question, you must submit this form and the supplemental form listed in the parentheses following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "No" to each question, you need not submit any of these forms.

- A. Is this facility an existing or proposed publicly owned treatment works which is a discharge to surface waters of the Commonwealth? (Form BRP WM 2A)

☐ Yes ☒ No ☐ Form Attached?

- B. Does or will this facility (either existing or proposed) include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to the surface waters of the Commonwealth? (Federal Form 2B)

☐ Yes ☒ No ☐ Form Attached?

- C. Does or will this facility result in a discharge to surface waters of the Commonwealth other than those described in A or B? (Federal Form 2C)

☐ Yes ☐ No ☐ Form Attached?

- D. Is this facility an existing or proposed treatment works which results in a discharge only of treated sewage to the land surface or to the ground waters of the Commonwealth? (Form GW-A)

☐ Yes ☐ No ☐ Form Attached?

- E. Does or will this facility include a concentrated animal feeding operation or aquatic animal production facility that results in a discharge to the land surface or ground waters of the Commonwealth? (Form GW-B)

☐ Yes ☒ No ☐ Form Attached?

- F. Does or will these facility result in a discharge to the land surface or ground waters of the Commonwealth other than those described in D or E above? (Form GW-C)

☐ Yes ☒ No ☐ Form Attached?



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Watershed Permitting Program

**BRP WM 06 – Permit and Plan Approval for
Type I Discharge (Non-Industrial)**

**Application for Individual Discharge Permit to Surface
Waters of the Commonwealth**

Transmittal Number _____

Date Received _____

A. Facility Information (continued)

7. Is this a RCRA facility as defined in 314 CMR 8.03? _____

☐ Yes

☒ No

If yes, submit the information on Form HW contained in 310 CMR 8.20 in accordance with the provisions of 314 CMR 8.08.

8. Industrial Classifications

List, in descending order of significance, the four (4) digit standard industrial classification (SIC) codes that best describe your facility in terms of the principal products or services you produce or provide. Also, specify each classification in words.

SIC Code

Specify

A. 0182 BEAN SPROUTS GROWN UNDER COVER _____

B. _____

C. _____

D. _____

Note: No application will be accepted without the SIC code number.

9. Facility Operator

CHANG FARMS, INC _____

Name

(413)665-3341 _____

Telephone Number (including extension)

E-mail address (optional) _____

415 RIVER ROAD _____

Mailing Address

WHATELY _____

City

MA _____

State

01373 _____

Zip Code

Ownership

- ☐ Individual
☐ Partnership
☒ Corporation
☐ Other

If other, please specify: _____

Status

- ☒ Private
☐ Public
☐ Other

If other, please specify: _____



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Watershed Permitting Program

**BRP WM 06 – Permit and Plan Approval for
Type I Discharge (Non-Industrial)**

Application for Individual Discharge Permit to Surface
Waters of the Commonwealth

Transmittal Number _____

Date Received _____

A. Facility Information (continued)

10. Location of Facility

- A. Is this facility located on Indian Lands? ☐ Yes ☒ No
- B. Provide a topographic map (USGS 1:25,000 scale 7 ½ Minute Topographic Series, quadrangle sheet) or maps of the area extending at least to one mile beyond the property boundaries of the facility that clearly show the following:
- The legal boundaries of the facility;
 - The location and serial number of each of your existing and proposed intake and discharge structures;
 - All hazardous waste management facilities;
 - All springs and surface water bodies in the area, plus all drinking water wells within one mile of the facility which are identified in the public record or otherwise known to you. If an intake or discharge structure, hazardous waste disposal site, or injection well associated with the facility is located more than one mile from the plant, include it on the map, if possible. If not, attach additional sheets describing the location of the structure, disposal site, or well, and identify the U.S. Geological Survey (or other) maps corresponding to the location.
 - On each map, include the map scale, meridian arrow showing north, and latitude and longitude to the nearest whole second. On all maps of rivers, show the direction of the current, and in tidal waters, show the directions of the ebb and flow tides. Use a 7 ½ minute series map published by the U.S. Geologic Survey.

11. Nature of Business

Briefly describe the nature of your business. Include products produced or services provided.

GROWING, HARVESTING, WASHING, AND PACKAGING OF BEAN SPROUTS FOR RETAIL
SALES

12. Water Supply Data

- A. List sources of water supply and annual water consumption for the past 5 years (last year first).

Water Sources	Year 1	Year 2	Year 3	Year 4	Year 5
1. 14 DRIVEN WELL POINTS	80,000	80,000	90,000	100,000	120,000
2.					
3.					
Total	80,000	80,000	90,000	100,000	120,000

- B. Please show the location of your water sources on the topographic map described in paragraph 10B.



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Watershed Permitting Program

**BRP WM 06 – Permit and Plan Approval for
Type I Discharge (Non-Industrial)**

Application for Individual Discharge Permit to Surface
Waters of the Commonwealth

Transmittal Number _____

Date Received _____

B. Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I will be responsible for publication of public notice of the applicable permit proceedings identified under 314 CMR 2.06(1)(a) through (d)."

Signature of applicant _____

SIDNEY CHANG

Printed name of applicant _____

(413)665-3341

Telephone Number (including extension) _____

J. MARK KRCMARIK, PE

Name of Preparer _____

(413)246-0421

Telephone Number (including extension) _____

Date Signed _____

VICE PRESIDENT

Title _____

SR. ENVIRONMENTAL ENGINEER

Title _____

MA DEP Water Management Act – Well Water Withdrawal

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL
PROTECTION
DIVISION OF WATER SUPPLY

FOR OFFICE USE ONLY:

Application No. _____

Date Received: _____

Fee Paid: _____

FORM A: GENERAL INFORMATION

1. Name of water system, town, farm, company or golf course:
CHANG FARMS, INC
2. Contact Person: SIDNEY CHANG Title: VICE PRESIDENT
3. Mailing address: Street: 415 RIVER ROAD
City: SOUTH DEERFIELD State: MA Zip code: 01373
4. Telephone: Please include area code (413) 665-3341
5. Volume requested (average gallons per day) for:
Years 1-5 150,000; Years 6-10 _____; Years 11-15 _____; Years 16-20 _____
(use totals from Form D2, D3; subtract registered volume if applicable)
6. Number of withdrawal points: groundwater: 14 surface water: _____
7. Name of basin where withdrawal(s) is located: CONNECTICUT RIVER
8. For what purpose will this water be used (in percent):
Agriculture: 100% cranberry: _____ Commercial: _____ Industrial: _____
Municipal: _____ Golf: _____ Residential: _____ Unaccounted: _____ Other: _____
9. Is this a public water supply? Yes _____ No X PWS ID No. _____
10. For public water suppliers, are you using DEM Division of Water Resources 20-year demand projections?
Yes _____ No _____
11. Permit length requested: (number of years) 5 YEARS
12. Town(s) where withdrawal point(s) is(are) located: WHATLEY
13. Does this application contain physically new withdrawals or construction which require an Environmental Notification Form? If an ENF is required, attach a copy or forward a copy to DEP when it is prepared.
Yes _____ No X
14. Name and address of local water resources management official in the community(s) in which your withdrawal(s) are located and to which you will send a copy of this application:
TOWN ADMINISTRATOR
TOWN OF WHATLEY

15. Is all or part of this volume:

an increase over registered volume? _____

currently being withdrawn? 120,000 GPD

a physically new withdrawal? 30,000 GPD (INCREASED PUMPING)

16. Are any of these points registered, if so, which ones?

Registration number: _____ Registered volume: _____

17. Which point(s) are currently in operation? (include date operation began for each)

14 HAND DRIVEN WELL POINTS

18. Which points are physically new withdrawal(s)? (include date of planned operation for each)

NONE

19. Are any of these withdrawal points subject to DEP's new source approval for public water suppliers? If so, identify which ones and indicate the current status or system safe yield:

N/A

20. A. Is some fraction of the water used to be discharged out of basin (include ocean discharge if appropriate)? Yes No (circle one)

1. If yes, and to only one out of basin destination, what fraction of your total discharge and to which basin?

a) _____ % will be discharged to the _____ basin

2. If yes, and to more than one out of basin destination, what fraction of your total discharge and to which basins?

a) _____ % will be discharged to the _____ basin

b) _____ % will be discharged to the _____ basin

c) _____ % will be discharged to the _____ basin

d) _____ % will be discharged to the _____ basin

B. What fraction of the water to be used will be discharged to this basin? _____ %

a) _____ % discharged to a public sewer system?

b) _____ % discharged to on-site sewage disposal systems?

c) _____ % discharged to another alternative (please describe)?

Form A, pg 3 of 3

21. Is there:

an NPDES permit? (if so, provide permit number) IN PROGRESS

groundwater discharge permit? (if so, provide permit number) _____

Please attach copies of any discharge permits.

22. What is the average annual daily discharge volume? 150,000 gpd23. Is the discharge volume metered? Yes X No _____

24. Explain, briefly, the need for this withdrawal:

THE WATER IS USED TO IRRIGATE SOY BEAN
SPROUTS. THE SPROUTS ARE GROWN AT THIS
FACILITY; A FRACTION OF THE WATER IS USED
TO WASH THE PRODUCT AND CLEAN EQUIPMENT

25. Is, or will, the demand for this withdrawal be supplemented by withdrawals from another river basin? (list withdrawals in other river basins, the location of each and volumes withdrawn from each)

Yes _____ No X

CERTIFICATION:

I certify, under penalty of law, that this application and all attachments were prepared under my supervision, in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted in this application, and the information submitted is, to the best of my knowledge and belief, true, accurate and complete.

Signature of Applicant _____

Title _____

Date _____

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL
PROTECTION
DIVISION OF WATER SUPPLY

FORM B: FOR A GROUNDWATER WITHDRAWAL POINT

Answer only if information is known and reliable

1. Name of withdrawal point. 14 WELL POINTS AT CHANG FARMS
2. Address of withdrawal point. Street: 415 RIVER ROAD
City WHATLEY State MA zip code 01373
3. Source Code _____ (for public water supplies)
4. Has this well been registered? Yes _____ No X
5. Has this well been in regular operation at any time? Yes X No _____
Month and year put in operation or planned _____
6. USGS quadrangle name: (see Appendix B) _____
7. Latitude: 42° 27' 40" N Longitude: 72° 35' 43" W
8. Please provide a locus map of the withdrawal and any associated reservoirs or ponds.

GEOLOGIC INFORMATION

9. Aquifer type: bedrock _____ confined _____ unconfined _____
Depth to bedrock: 400 FT ±

WELL INFORMATION

10. Well type:
Gravel pack _____ Gravel developed _____
Tubular well field _____ Dug well _____ Other DRIVEN
11. Year to be installed: (if not already installed) INSTALLED
12. Well depth: 23 TO 30 FT (TO TOP OF CLAY SEAM)
13. Depth to water level when installed: 14 FEET ±
14. Name and address of well driller
HAND DRIVEN BY OWNER

PUMPING INFORMATION

15. Was a pump test conducted on this well? Yes ☒ No ☐

If so, provide date: 13 JUN + 2004

Firm conducting the test: OWNR

If no, is one planned? _____

16. Has a Zone II delineation been performed for this well? Yes _____ No ☒

If so, has this Zone II been approved by the Department? Yes _____ No _____

Date of Zone II delineation _____

Firm conducting Zone II delineation _____

17. What is the maximum daily withdrawal rate? 180,000 GPD

18. Is this a DEP-approved withdrawal rate? Yes ☐ No ☒

METER INFORMATION

19. If in operation, is this withdrawal metered? Yes ☒ No ☐

20. If proposed, when will this withdrawal be metered? _____

21. Type of flow measurement device installed or planned:

weir _____ flume _____ venturi _____ other meter _____ other TURBINE

22. Capacity of flow measurement device: 300 GPM

23. Recordings are: continuous ☒ manual ☐

24. Last date of calibration, if in operation: _____

FORM D1: COMPUTATION OF HISTORIC WITHDRAWAL VOLUME

CHECK APPLICABLE ITEM:

- ☐ COMBINED GRAND TOTAL FORM
☐ INDIVIDUAL WITHDRAWAL POINT
☐ REGISTERED WITHDRAWAL POINT
☐ WITHDRAWAL POINT NAME: _____

1. Even if the withdrawal point is registered, please complete the entire form for each withdrawal point.
2. For each withdrawal point in your application, fill out the charts below to show total monthly historic withdrawal volume in millions of gallons.
NOTE: 100,000 gallons = 0.10 MG
3. Add the individual withdrawal point volumes and enter onto a separate Form D1 (a Combined Grand Total Form) to show the total monthly historic withdrawal volumes.

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL
1981													
1982													
1983													
1984													
1985													

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL
1986													
1987													
1988													
1989													
1990													
1991													
1992													
1993													

THIS DATA IS NOT AVAILABLE IN THIS DETAIL.

FORM D2: PROJECTION OF WITHDRAWAL VOLUME - Years 1-20

1. Fill in the projected daily average water withdrawal in millions of gallons in Column 1. NOTE: 100,000 gallons = 0.10 MG
2. In Column 2, fill in the number of days you expect to operate.

FOR YEAR-ROUND WITHDRAWALS, enter 365 days.

FOR SEASONAL WITHDRAWALS, multiply the number of months that you will operate each year by 30 to get the days of operation (i.e., a golf course that irrigates during April, May, June, July, August, September and October, would enter 7 months of operation x 30 days = 210 days of operation.)

3. Multiply the average daily water withdrawal (Column 1) by the days of operation (Column 2) to get the total annual water withdrawal. Enter the number in Column 3.

YEAR	1. AVERAGE DAILY WATER WITHDRAWAL	2. DAYS OF OPERATION	3. TOTAL ANNUAL WATER WITHDRAWAL
1994			
1995			
1996			
1997			
1998	80,000	365	29.2 MG
1999	80,000	365	29.2 MG
2000	80,000	365	29.2 MG
2001	90,000	365	32.9 MG
2002	90,000	365	32.9 MG
2003	100,000	365	36.5 MG
2004	120,000	365	43.8 MG
2005	150,000	365	54.8 MG
2006	150,000	365	54.8 MG
2007	150,000	365	54.8 MG
2008	150,000	365	54.8 MG
2009	150,000	365	54.8 MG
2010			
2011			
2012			
2013			
2014			

Years 1-5

Years 6-10

Years 11-15

Years 16-20

4. The requested withdrawal volume during Years 1-5, Years 6-10, Years 11-15 and Years 16-20 of the permit period is shown in Column 1 for the Years 1999, 2004, 2009 and 2014.

Average daily withdrawal volumes for Years 1-5 _____ Years 6-10 _____ Years 11-15 _____ Years 16-20 _____

5. If part of this volume is registered, subtract the registered volume from the average daily withdrawal volumes for Years 1-5, Years 6-10, Years 11-15, and Years 16-20 to get the requested permit volumes.

Average daily withdrawal volume for Years 1-5 _____ - Registered volume _____ = Requested permit volume for 1994-1999 _____

(Years 1-5)

Average daily withdrawal volume for Years 6-10 _____ - Registered volume _____ = Requested permit volume for 1999-2004 _____

(Years 6-10)

Average daily withdrawal volume for Years 11-15 0.15MGD Registered volume 0 = Requested permit volume for 2004-2009 0.15MGD (150,000 GPD)

(Years 11-15)

Average daily withdrawal volume for Years 16-20 _____ - Registered volume _____ = Requested permit volume for 2009-2014 _____

(Years 16-20)

6. Enter these requested permit volumes on Form A, Number 5, Years 1-5, Years 6-10, Years 11-15, and Years 16-20.

FOR WITHDRAWALS WITH SEASONAL VARIATION

7. Withdrawals are often made at varying rates over the course of the season or year. For example, golf courses typically irrigate for six or seven months per year, with peak irrigation taking place during the summer months, an industry might eliminate one shift during the summer, or a public water supplier might have a large summer population to supply.

If your withdrawal has large seasonal variations, please show the pattern of monthly withdrawals for a typical year in the space below. The numbers you use can be actual projections for one year during the permit period.

	January	February	March	April	May	June	July	August	September	October	November	December
Year 2004	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%

If you expect the seasonal variation in your withdrawal to change during the permit period, or if you feel that there is any unique aspect to the pattern of your withdrawal, please provide that information in the space below.

Form F, pg 1 of 3

FORM F: EVALUATION OF POTENTIAL EFFECTS OF PROPOSED WITHDRAWAL

Please address these questions separately for each proposed withdrawal point, as well as the effect of your entire withdrawal. Please reference any tests, studies or reports you use to provide information here.

WITHDRAWAL POINT(S): 14 WELL POINTS AT CHANG FARMS

Wastewater Treatment or Assimilation:

Will the water be discharged into a treatment system? Yes _____ No X

Will the water be discharged to a stream X, pond _____, reservoir _____, individual septic systems _____?

If the water will not be discharged to a treatment system, please provide a map showing the points of withdrawal and discharge. SEE APPENDIX A

What pollutants will be added or removed in the discharge?

SEE

Will the treatment system have the capacity to process that volume of water? Yes _____ No _____

How does the volume of the discharge compare with the volume of the receiving waters?

LESS THAN 0.1%

Wetlands:

Will work on any part of the property on which the withdrawal is to be made be covered by or require an Order of Conditions under M.G.L. c.132, s.40? Yes _____ No _____

If yes, please attach a copy of the Order of Conditions.

If no, based upon a negative Determination of Applicability issued by the Department, please attach a copy of that determination.

Is the property impressed with a Wetland Restriction, recorded pursuant to M.G.L. c.130, s.105? Yes _____ No _____

If yes, and neither a negative Determination of Applicability or an Order of Conditions has been issued, please attach a copy of the Restriction Order.

Wildlife, Fisheries and Floral Habitat:

DEP will conduct a review in conjunction with the MA Division of Fisheries & Wildlife and other State agencies that have information about environmental resources in the vicinity of your proposed withdrawal. To facilitate this review, please complete the following, based on the best information you have available.

Is this withdrawal in the vicinity of any known or designated aquatic habitats for fish and wildlife and flora, such as:

	Yes	No
Rare/threatened or special concern species	_____	<u>X</u>
Priority wildlife habitats	_____	<u>X</u>
Priority natural communities	_____	<u>X</u>
Major coolwater/warmwater fisheries	_____	<u>X</u>
Native and/or wild salmonid populations	_____	<u>X</u>
Seasonally stocked trout waters	_____	<u>X</u>

Agriculture:

Is the withdrawal within 1/4 mile of any farming operation? Yes X No _____

Describe the effect of the withdrawal on water supply or quality for any of these farming operations.

THE FARMING OPERATIONS ARE NOT AFFECTED AS WATER IS FROM GROUND WATER

Navigation:

Is this withdrawal made directly from or adjacent to a navigable:
river X stream _____ lake _____ pond _____?

If so, describe how the withdrawal will affect water levels.

THERE WILL NO MEASURABLE AFFECT.

Might the withdrawal result in the surface water becoming unnavigable at any time? Yes _____ No _____

If so, please describe how and when this might occur. If the surface water already becomes unnavigable during certain periods, to what extent would the proposed withdrawal lengthen these periods?

Water Based Recreation:

Is there any water-based recreation near your withdrawal, or downstream of it? Yes _____ No X

Please describe type of activity, number of users, and distance from withdrawal.

Would any existing or potential recreational activities be precluded or otherwise impacted due to the approval and implementation of the proposed withdrawal? If so, please describe the nature and extent of the impact?

No

QUESTIONS FOR GROUNDWATER WITHDRAWALS

Form F, pg 3 of 3

Groundwater Recharge Areas:

Describe any studies that have been done of the recharge area to this well.
(Attach a copy of the study if available)

THE RECHARGE RECOVERY WAS MEASURED ON
13 JUNE 2004; RECOVERY WAS APPROXIMATELY 40 MINUTES

Will the project include any paving over of any aquifer recharge area?
Yes ☐ No ☒

QUESTIONS FOR SURFACE WATER WITHDRAWALS

Hydropower Resources:

Is this withdrawal upstream from an existing or proposed hydropower facility? Yes ☐ No ☒

If so, how far? _____

What is the minimum volume needed for this hydropower facility? _____

Floodplains:

Is the withdrawal within the 100-year floodplain? Yes ☐ No ☒

Describe any changes in local drainage patterns as a result of the withdrawal.

FORM G: ALTERNATIVES TO THE PROPOSED WITHDRAWAL

1. The Proposed withdrawal. (Use the information on the proposed withdrawal for comparison with any other alternatives available.)

Cost: NOT FEASIBLE DUE TO SUPPLY LIMITS

Feasibility: USE OF WATER FROM BOTH THE TOWN OF WHATELY AND DEERFIELD WAS INVESTIGATED, NEITHER TOWN HAS ADEQUATE CAPACITY TO SERVE THIS DEMAND

Environmental effect (summarized): NONE

Impact on others: THERE ARE NO KNOWN IMPACTS REAL OR FORESEEN BY THIS WITHDRAWAL BASED ON PROXIMITY TO CONNECTICUT RIVER.

2. Leak detection alternative.

Cost: _____

Feasibility: _____

Environmental effect (summarized): _____

Impact on others: _____

Reduction in volume withdrawn: _____

Other comments: _____

3. Increased conservation and demand management.

Cost: _____

Feasibility: THE SPROUTS ARE CURRENTLY SPRAYED
INTERMITTENTLY USING STATE-OF-THE-ART EQUIPMENT
NO FURTHER REDUCTION CAN BE ACHIEVED

Environmental effect (summarized): NONEImpact on others: NONE

Reduction in volume withdrawn: _____

Other comments: _____

4. Alternative Withdrawal Points.

Location of withdrawal points: A DEEP WELL WAS
ATTEMPTED BUT COULD NOT PRODUCE WATER
QUALITY REQUIRED

Cost: _____

Feasibility: _____

Environmental effect (summarized): _____

Impact on others: _____

other comments: _____

5. No action alternative

Cost: _____

Feasibility: _____

Environmental effect (summarized): _____

Impact on others: _____

Other comments: _____

6. Alternative _____

Cost: _____

Feasibility: _____

Environmental effect (summarized): _____

Impact on others: _____

Form G, pg 4 of 4

Other comments: _____

7. Continue in this format for as many alternatives as you have.

Form H: Groundwater Hydraulic Analysis

Applicant's name: CHANG FARMS, INCMailing Address: street: 415 RIVER ROADcity: WHATLEY state: MA zip code 01373Telephone no.: (413) 665 3341

Signature: _____ Date: _____

Please complete the Step 1: Evaluation of Pump Test Need as described on page 32 of the guidelines.

Applicants who have conducted a pumping test which meets the criteria outlined in the Guidelines and Policies for Public Water Systems may submit the pumping test report in place of worksheets 1 through 6.

If this Groundwater Hydraulic Analysis is completed by a professional engineer or hydrogeologist or hydrologist, please complete the following.

Reviewer's name: J. MARK KREMANIKMailing Address: street: 1391 MAIN ST.city: SPRINGFIELD state: MA zip code 01103Telephone no.: (413) 346 0421

Signature: _____ Date: _____

Affix engineer's stamp below and sign.

Step 1: General Information
Worksheet 1

Indicate the location of each planned groundwater withdrawal point on Map
2. Also indicate the location of the planned discharge. Copy this sheet
as necessary.

1. Water system name: CHANG FARMS

2. Proposed groundwater withdrawal location information

City or Town: WATLEY

River Basin: CONNECTICUT RIVER

7.5 min. USGS topographic map quadrangle name: _____

Proposed number of withdrawals: _____

<u>Withdrawal #</u>	<u>Well Name</u> <u>or ID #</u>	<u>Max w/d</u> <u>Rate (MGD)</u>	<u>Depth of</u> <u>Well (ft)</u>	<u>Latitude</u> <u>(deg., min., sec)</u>	<u>Longitude</u>
1. <u>11 to 24</u>		<u>0.187</u>	<u>23 FT</u>		
2.					
3.					
4.					
5.					
6.					
7.					

ALL WELLS APPROXIMATELY SAME
TOTAL FLOW WITH 10 WELLS PUMPING
WAS 130 GPM FOR 24 HOURS; GROUND
WATER RECOVERY LESS THAN 40 MINUTES.

Steps 2 and 3: Pump Test Well Information
Worksheet 2

Complete one sheet for each pump test well if more than one was used. Indicate the location of each production well and its discharge point on Map 2. Copy this sheet as necessary.

1. Production well name or I.D. (from Worksheet 1): 10 WELLS OF 1A
2. Production well location: Latitude: 42° 27' 40" N
(deg, min, sec) Longitude: 72° 35' 43" W
3. Production well elevation (feet): _____
Reference point on well (e.g. top of casing): _____
Location of benchmark: _____
4. Pump test date: 13 JUN 2004
5. Test well pumping rate (gpm): 130
6. Test well diameter (inches): 1 1/4"
7. Test well depth (feet): 23 FT
8. Depth to bedrock or confining layer (if known): 30 FT ±
9. Test well screen length (feet): 2.0
10. Test well screen interval measured from ground surface elevation (feet): from _____ to _____
11. Duration of pump test (hours): 24
12. Distance from the test well withdrawal point to the test well point of discharge (feet): 25 FEET
13. Is the discharge point upgradient or downgradient of the test well: DOWN
14. Driller's boring logs included herein (yes/no): NO
(please attach to this sheet)

WELL HAND DRIVEN

Steps 2 and 3: Observation Well Information
Worksheet 3

Complete one sheet for each observation well. Indicate its location on Map 3. Copy this sheet as necessary.

1. Observation well no. (as on Map 3): 11 THROUGH 24
2. Reference Elevation (feet): _____
3. Radial distance from pump test well (feet): _____
4. Observation well depth (feet): 23 FEET
5. Observation well screen length (feet): 2.0
6. Observation well screen interval measured from ground surface elevation (feet): from _____ to _____
7. Distance from the observation well to the point of discharge (feet): 25 FEET
8. Driller's bore logs included herein (yes/no): NO (Please attach to this sheet)
9. Attach the semi-log time-drawdown graph that corresponds to this observation well. Note number of the production well, date of the pump test, and calculated values on the graph itself.
10. Aquifer properties estimated from this observation well:
Storativity: _____
Transmissivity (gal/day/ft): _____

Steps 2 and 3: Hydrogeological Information
Worksheet 4

1. Based on the core boring logs or other geophysical evidence, will the proposed withdrawal be from a confined, unconfined, or leaky aquifer?

GROUND WATER SOURCE

2. Describe the evidence you have to substantiate which type of aquifer your withdrawal will come from:

YES

3. Describe the general vertical stratigraphy found during drilling and the depth of the important strata encountered during logging:

TOP SOIL 1 FOOT

SANDY S. LT GLACIAL	30 FEET
CLAY (TIGHT)	360 FEET
BED ROCK	400 FEET

BASED ON INFORMATION FROM OWNER WHEN
DEEP WELL WAS DRILLING. BORING LOG NOT AVAILABLE
FROM DRILLER

4. Additional comment:

Steps 2 and 3: Boundary Conditions
Worksheet 5

This worksheet will serve to summarize the boundary conditions used in the Theis analysis leading to Map 3. Indicate the location of each recharge or impermeable boundary and identify it by name or number. Copy this sheet as necessary.

1. List any great ponds (larger than 10 acres) represented by the source image wells in the Theis analysis. Wetlands should not be used as recharge boundaries.

Name or ID no.	Distance from Test Well (ft)	Surface Water Elevation (ft)	Amount of Water Induced by Well
-------------------	---------------------------------	---------------------------------	------------------------------------

1. None

2. _____

3. _____

2. List any rivers or streams represented by source image wells in the Theis analysis. Show calculations and cite source of information. Attach to this sheet.

Name or ID no.	Amount of Water Induced by Well (gpm)
-------------------	---

1. None

2. _____

3. _____

3. Describe the lateral impermeable geologic boundaries that are represented by sink image wells in the Theis analysis. Cite sources of information. Attach to this sheet.

Type of Impermeable Boundary	Boundary ID Number
---------------------------------	-----------------------

1. None

2. _____

3. _____

4. What is the magnitude of the general hydraulic gradient (ft/ft)?

Form H, pg 7 of 7

Step 2: Summary Aquifer Parameters
Worksheet 6

Please summarize all the values of transmissivity and storativity. Please indicate whether the analysis was done by Jacob, distance-drawdown, or other method.

Well(s)	Method	Transmissivity (gal/day/ft)	Storativity
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

If the analyses indicate additional information regarding aquifer heterogeneity, anisotropy, directional transmissivity, layering, etc., please comment below or on attached pages.

FURTHER ANALYSES CAN BE PROVIDED
IF REQUIRED BY DEP. THE WELLS
CURRENTLY PROVIDE THE NEEDS WITH
NO IMPACTS WITH NO PROBLEMS WITH
RECHARGE AFTER WELLS TESTED FOR
24 HOURS.

Chang Farm

Sidney Chang
Date: 04/28/2004

Natural Resources Conservation Service
Sara Izquierdo, Soil Conservationist



Scale 1:6,000
1" = 500'



500 0 500 1000 Feet

A horizontal scale bar with alternating black and white segments, marked with the numbers 500, 0, 500, and 1000 Feet.

Chang Farms, Inc
South Deerfield, MA 01373

Abutters List

Map 33

- | | |
|-----|---|
| 7 | Shirley M. Ring and Tammy Warger
174A Long Plain Road
South Deerfield, MA 01373 |
| 8 | Hugh and Penny Ann Manheim
311A River Road
South Deerfield, MA 01373 |
| 8-1 | Commonwealth of Massachusetts DEM
100 Cambridge Street
Boston, MA 02202 |

MAP 32

- | | |
|------|---|
| 46-3 | Alan E, Alan E, Jr. and Bradley Sanderson
P.O. Box 86
Whatley, MA 01093 |
| 3-1 | EAP Leasing Corp
192 River Road
South Deerfield, MA 01373 |
| 2-1 | Robert and Dianne Cendrowski
3 Sugarloaf Street Extension
South Deerfield, MA 01373 |
| 2 | Charles and Rose Wojtkielewicz
7 Sugarloaf Street Extension
South Deerfield, MA 01373 |
| 6 | Edwin W. and Blanche Wojtkielewicz
3 Sugarloaf Street Extension
South Deerfield, MA 01373 |

Chang Farms, Inc
South Deerfield, MA 01373

Abutters List

MAP 26

36 Timothy M. and Mary C. Nourse
29 River Road
South Deerfield, MA 01373

MAP 27

28 Sidney Chang
PO Box 191
South Deerfield, MA 01373

26 Gerald P. Sadoski
PO Box 33
South Deerfield, MA 01373

27 Maryann A, Sadoski and Mitchell and Thomas Sadoski
287 River Road
South Deerfield, MA 01373

22 James M. Pasiecznik
209 River Road
South Deerfield, MA 01373

Well Test Data

Sample#7521

HOWARD LABORATORIES of NEW ENGLAND, INC
 750 North Pleasant Street
 Amherst, MA 01002
 Phone: (413)549-8260 Fax: (413)549-1850
 MA Lab Lic# M-00851
WATER ANALYSIS REPORT

Analyzed For: Sidney Chang
 Address: 301 River Road
 P.O. Box 191
 South Deerfield, MA 01373

Sample Location: 301 River Road
 Whately, MA

Telephone: 413-665-3341
 Sampled By: Sidney Chang
 Date Sampled: 8/24/00
 Date Received: 8/25/00

Parameter	Results	Limits	Comments
Total Coliform Bacteria	* Present	0 colonies/100ml	* Disinfect Well No E.coli
pH	6.61 pH units	6.5-8.5 pH Units	OK
Manganese	* 0.056 mg/l	0.05 mg/l	*
Hardness	90 mg/l	No Standard	<50 soft, >100 hard
Conductivity	0.27 uS/cm	No Standard	No Standard
Chloride	18.4 mg/l	250mg/l	OK
Iron	* 2.36 mg/l	0.3mg/l	*
Sodium	12 mg/l	20mg/l	OK
Nitrate	10.5 mg/l	10mg/l	OK
Nitrite	0.024 mg/l	1mg/l	OK
Color	* 130 pcu Color Units	15 Pt Co Color Units	*
Turbidity	* 45.2 NTU	5 NTU	*

Recommendations: See enclosed Well Disinfection sheet. See enclosed MA DEP interpretations sheet for pH, manganese, iron, nitrate, color and turbidity. This sample meets acceptable standards of potability for the parameters tested, except for those parameters marked with an asterisk (*).

Analyst: DC
 Checked By: Jonathan S. Beqq
 Laboratory Supervisor

Date: 9/13/00

07/24/2003

07/24/2003 NO Bacteria submitted.

"P" = PRESENCE

"EP" = E. COLI PRESENCE

"NBR" No Bacteria Required.

"A" = ABSENCE

"EA" = E. COLI ABSENCE

Analysis Performed:

MCL (mg/l)	Det. Level	Level Detected
---------------	---------------	-------------------

Total coliform

P	P	A
---	---	---

Inorganic chemicals - metals:

Aluminum	0.2	0.1	ND
Arsenic	0.05	0.020	ND
Barium	2	0.30	ND
Cadmium	0.005	0.002	ND
Chromium	0.1	0.010	ND
Copper	1.3	0.004	ND
Iron	0.3	0.020	ND
Lead	0.015	0.002	ND
Manganese	0.05	0.004	0.010
Mercury	0.002	0.001	ND
Nickel	0.1	0.02	ND
Selenium	0.05	0.020	ND
Silver	0.1	0.002	ND
Sodium	---	1.0	7
Zinc	5	0.004	0.014

Inorganic chemicals - other, and physical factors:

Alkalinity (Total as CaCO ₃)	---	20	25
Chloride	250	5.0	14
Fluoride	4	0.5	ND
Nitrate as N	10	0.5	10
Nitrite as N	1	0.5	ND
Sulfate	250	5.0	25
Hardness (suggested limit = 100)	---	10	90
pH (Standard Units)	6.5-8.5	---	5.9*
Total Dissolved Solids	500	20	110
Turbidity (Turbidity Units)	1.0	0.1	ND

Organic chemicals - trihalomethanes:

Bromoform	0.080	0.004	ND
Bromodichloromethane	0.080	0.002	ND
Chloroform	0.080	0.002	ND
Dibromochloromethane	0.080	0.004	ND
Total THMs (sum of four above)	0.080	0.002	ND

Sample # 8202

HOWARD LABORATORIES OF NEW ENGLAND, INC.

750 North Pleasant Street

Amherst, MA 01002

Phone: (413) 549-8260 Fax: (413) 549-1850

MA Lab License: M-00851

WATER ANALYSIS REPORT

Analyzed For: Chang Farm

Address: P.O. Box 191

South Deerfield, MA. 01373

Sample Location: East Well

Sampled By: S.C.

Date Sampled: 5-31-2001

Date Received: 5-31-2001

Telephone: 1-413-665-3341

PARAMETER	RESULTS	LIMITS	COMMENTS
Total Coliform Bacteria	0 Colonies/ 100ml	0 Colonies/ 100ml	OK
pH	*6.44 pH Units *	6.5 - 8.5 pH Units	*
Manganese	0.021 mg/l	0.05 mg/l	OK
Hardness	92.0 mg/l	No Standard	<50 SOFT, >100 HARD
Conductivity	0.21 mS/cm	No Standard	No Standard
Chloride	19.2 mg/l	250 mg/l	OK
Iron	0.00 mg/l	0.3 mg/l	OK
Sodium	14 mg/l	25 mg/l	OK
Nitrate	4.3 mg/l	10 mg/l	OK
Nitrite	0.009 mg/l	1 mg/l	OK
Color	0 PtCo Color Units	15 PtCo Color Units	OK
Turbidity	0.33 NTU	5 NTU	OK

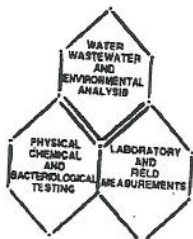
Recommendations: See enclosed MA DEP chemical interpretation sheet for pH.

This sample meets acceptable standards of potability for the parameters tested except for the parameter marked with an asterisk (*).

Analyst: B.A.

Checked By: Jonathan S. Begg Laboratory Supervisor

Date: 5-31-2001



BERKSHIRE ENVIRO-LABS, INC.
 CORNER OF MAIN & CENTER STREETS
 266 MAIN STREET, LEE, MASS. 01238 (413) 243-1416

Whately Water Department

L- 5007

Page 1 of 1

SAMPLE NUMBER		116995			
DATE COLLECTED		3/20/02			M/ACL - R*
TIME COLLECTED		9:30am			
COLLECTED BY		T. Lussier			
DATE ANALYZED		3/21/02			
ANALYZED BY		W.E.-B.W.			
ANALYSIS	UNITS				
Bacteriological					
Total Coliform	/100ml	0			0 (M)
E. Coli	/100ml	0			0 (M)
Physical - Chemical					
pH	SU	7.94			6.0 to 9.0 (A)
Alkalinity	mg/l	118			50 to 100 (A)
Chloride	mg/l	9.5			250 (A)
Fluoride	mg/l	0.28			4.0 (M)
Hardness	mg/l	122			50 to 100 (A)
Calcium	mg/l	37			75 (A)
Iron	mg/l	0.02			0.3 (A)
Manganese	mg/l	0.07			0.05 (A)
Sodium	mg/l	19.6			28 (A)
Sulfate	mg/l	26.7			250 (A)
Ammonia	mg/l	<0.01			0.050 (A)
Nitrite	mg/l	<0.01			1.0 (M)
Nitrate	mg/l	<0.01			10.0 (M)

*M/ACL - R: Advised Maximum-(M) or Action-(A) Contaminant Level or Range (See Attached Interpretation Sheet)
 Sample #116995: Kitchen Tap, East School

< = Less Than
 > = Greater Than

William S. Enser, Jr.
 Director

Sample # 8883

HOWARD LABORATORIES OF NEW ENGLAND, INC.

750 North Pleasant Street

Amherst, MA 01002

Phone: (413) 549-8260 Fax: (413) 549-1850

MA Lab License: M-00851

WATER ANALYSIS REPORT

Analyzed For: Chang Farm

Address: 301 River Rd.

S. Deerfield, MA 01373

Location: Deep Well

Telephone: 665-3341

Sampled By: D. Pang

Date Sampled: 10-30-2001

Date Received: 10-30-2001

[illegible]

Recommendations:

This sample meets acceptable standards of potability for the parameters tested.

Analyst: J.K.

Date: 11-2-2001

Checked By: Jonathan S. Begg
Laboratory Supervisor

DATE COLLECTED	DATE RECEIVED	DATE COMPLETED	SAMPLE CODE
02/17/99	02/18/99	03/02/99	8380684

CUSTOMER ADDRESS

SIDNEY CHANG
PO BOX 191
SOUTH DEERFIELD, MA 01373-

DEALER ADDRESS



**NATIONAL
TESTING
LABORATORIES LTD.**
6555 Wilson Mills Road
Cleveland, OH 44143
(440) 449-2525

DRINKING WATER ANALYSIS RESULTS

ID: WELL WATER

NOTE: "*" The MCL (Maximum Contaminant Level) or an established guideline has been exceeded for this contaminant.
 "***" Bacteria results may be invalid due to lack of collection information or because the sample has exceeded the 30-hour holding time.
 "ND" This contaminant was not detected at or above our stated detection level.
 "NBS" No bacteria submitted. "NBR" No Bacteria Required.
 "P" = PRESENCE "A" = ABSENCE
 "EP" = E. COLI PRESENCE "EA" = E. COLI ABSENCE

Analysis Performed	MCL (mg/l)	Det. Level	Level Detected
--------------------	---------------	---------------	-------------------

Total coliform	P	P	A
----------------	---	---	---

Inorganic chemicals - metals:

Aluminum	0.2	0.1	ND
Arsenic	0.05	0.020	ND
Barium	2	0.30	ND
Cadmium	0.005	0.002	ND
Chromium	0.1	0.010	ND
Copper	1.3	0.004	ND
Iron	0.3	0.020	ND
Lead	0.015	0.002	ND
Manganese	0.05	0.004	0.010
Mercury	0.002	0.001	ND
Nickel	0.1	0.02	ND
Selenium	0.05	0.020	ND
Silver	0.1	0.002	ND
Sodium	---	1.0	7
Zinc	5	0.004	0.014

Inorganic chemicals - other, and physical factors:

Alkalinity (Total as CaCO3)	---	20	25
Chloride	250	5.0	14
Fluoride	4	0.5	ND
Nitrate as N	10	0.5	10
Nitrite as N	1	0.5	ND
Sulfate	250	5.0	25

Sample#7521

HOWARD LABORATORIES of NEW ENGLAND, INC

750 North Pleasant Street

Amherst, MA 01002

Phone: (413)549-8260

Fax: (413)549-1850

MA Lab Lic# M-00851

WATER ANALYSIS REPORT

Analyzed For: Sidney Chang

Address: 301 River Road

P.O. Box 191

South Deerfield, MA 01373

Sample Location: 301 River Road
Whately, MA

Sampled By: Sidney Chang

Date Sampled: 8/24/00

Date Received: 8/25/00

Telephone: 413-665-3341

Parameter	Results	Limits	Comments
Total Coliform Bacteria	* Present	0 colonies/100ml	* Disinfect Well No E.coli
pH	6.61 pH Units	6.5-8.5 pH Units	OK
Manganese	* 0.056 mg/l	0.05 mg/l	*
Hardness	90 mg/l	No Standard	<50 soft, >100 hard
Conductivity	0.27 mS/cm	No Standard	No Standard
Chloride	18.4 mg/l	250mg/l	OK
Iron	* 2.36 mg/l	0.3mg/l	*
Sodium	12 mg/l	28mg/l	OK
Nitrate	10.5 mg/l	10mg/l	OK
Nitrite	0.024 mg/l	1mg/l	OK
Color	* 130 Peco Color Units	15 Pt Co Color Units	*
Turbidity	* 45.2 NTU	5 NTU	*

Recommendations: See enclosed Well Disinfection sheet. See enclosed MA DEP interpretations sheet for pH, manganese, iron, nitrate, color and turbidity. This sample meets acceptable standards of potability for the parameters tested, except for those parameters marked with an asterisk (*).

Analyst: DC

Checked By: Jonathan S. Beegs
Laboratory Supervisor

Date: 9/13/00

NO Bacteria submitted.
 "P" = PRESENCE
 "EP" = E. COLI PRESENCE

"NBR" No Bacteria Required.
 "A" = ABSENCE
 "EA" = E. COLI ABSENCE

Analysis Performed

MCL (mg/l)	Det. Level	Level Detected
---------------	---------------	-------------------

Total coliform

P	P	A
---	---	---

Inorganic chemicals - metals:

Aluminum	0.2	0.1	ND
Arsenic	0.05	0.020	ND
Barium	2	0.30	ND
Cadmium	0.005	0.002	ND
Chromium	0.1	0.010	ND
Copper	1.3	0.004	ND
Iron	0.3	0.020	ND
Lead	0.015	0.002	ND
Manganese	0.05	0.004	0.010
Mercury	0.002	0.001	ND
Nickel	0.1	0.02	ND
Selenium	0.05	0.020	ND
Silver	0.1	0.002	ND
Sodium	---	1.0	7
Zinc	5	0.004	0.014

Inorganic chemicals - other, and physical factors:

Alkalinity (Total as CaCO3)	---	20	25
Chloride	250	5.0	14
Fluoride	4	0.5	ND
Nitrate as N	10	0.5	10
Nitrite as N	1	0.5	ND
Sulfate	250	5.0	25
Hardness (suggested limit = 100)	---	10	90
pH (Standard Units)	6.5-8.5	---	5.9*
Total Dissolved Solids	500	20	110
Turbidity (Turbidity Units)	1.0	0.1	ND

Organic chemicals - trihalomethanes:

Bromoform	0.080	0.004	ND
Bromodichloromethane	0.080	0.002	ND
Chloroform	0.080	0.002	ND
Dibromochloromethane	0.080	0.004	ND
Total THMs (sum of four above)	0.080	0.002	ND

Sample # 8202

HOWARD LABORATORIES OF NEW ENGLAND, INC.

750 North Pleasant Street

Amherst, MA 01002

Phone: (413) 549-8260 Fax: (413) 549-1850

MA Lab License: M-00851

WATER ANALYSIS REPORT

Analyzed For: Chang Farm

Address: P.O. Box 191

South Deerfield, MA. 01373

Sample Location: East Well

Sampled By: S.C.

Date Sampled: 5-31-2001

Date Received: 5-31-2001

Telephone: 1-413-665-3341

PARAMETER	RESULTS	LIMITS	COMMENTS
Total Coliform Bacteria	0 Colonies/ 100ml	0 Colonies/ 100ml	OK
pH	*6.44 pH Units *	6.5 - 8.5 pH Units	*
Manganese	0.021 mg/l	0.05 mg/l	OK
Hardness	92.0 mg/l	No Standard	<50 SOFT, >100 HARD
Conductivity	0.21 mS/cm	No Standard	No Standard
Chloride	19.2 mg/l	250 mg/l	OK
Iron	0.00 mg/l	0.3 mg/l	OK
Sodium	14 mg/l	28 mg/l	OK
Nitrate	4.3 mg/l	10 mg/l	OK
Nitrite	0.009 mg/l	1 mg/l	OK
Color	0 PtCo Color Units	15 PtCo Color Units	OK
Turbidity	0.33 NTU	5 NTU	OK

Recommendations: See enclosed MA DEP chemical interpretation sheet for pH.

This sample meets acceptable standards of potability for the parameters tested except for the parameter marked with an asterisk (*).

Analyst: B.A.

Date: 5-31-2001

Checked By: Jonathan S. Begg Laboratory Supervisor

Sample # 8656

HOWARD LABORATORIES OF NEW ENGLAND, INC.

750 North Pleasant Street
 Amherst, MA 01002
 Phone: (413) 549-8260 Fax: (413) 549-1850
 MA Lab License: M-00851

WATER ANALYSIS REPORT

Analyzed For: Chang Farm
 Address: P.O. Box 191
 South Deerfield, MA 01373

Location: N-22 & N-18

Telephone: 665-3341

Sampled By: S.C.
 Date Sampled: 9-6-2001
 Date Received: 9-6-2001

PARAMETER	RESULTS	LIMITS	COMMENTS
Total Coliform Bacteria N-22	0 Colonies/ 100ml	0 Colonies/ 100ml	OK
Total Coliform BACTERIA N-18	1 Colonies/ 100ml	0 Colonies/ 100ml	* Present
E. Coli BACTERIA N-22	0 Colonies/ 100ml	0 Colonies/ 100ml	OK
E. Coli BACTERIA N-18	0 Colonies/ 100ml	0 Colonies/ 100ml	OK

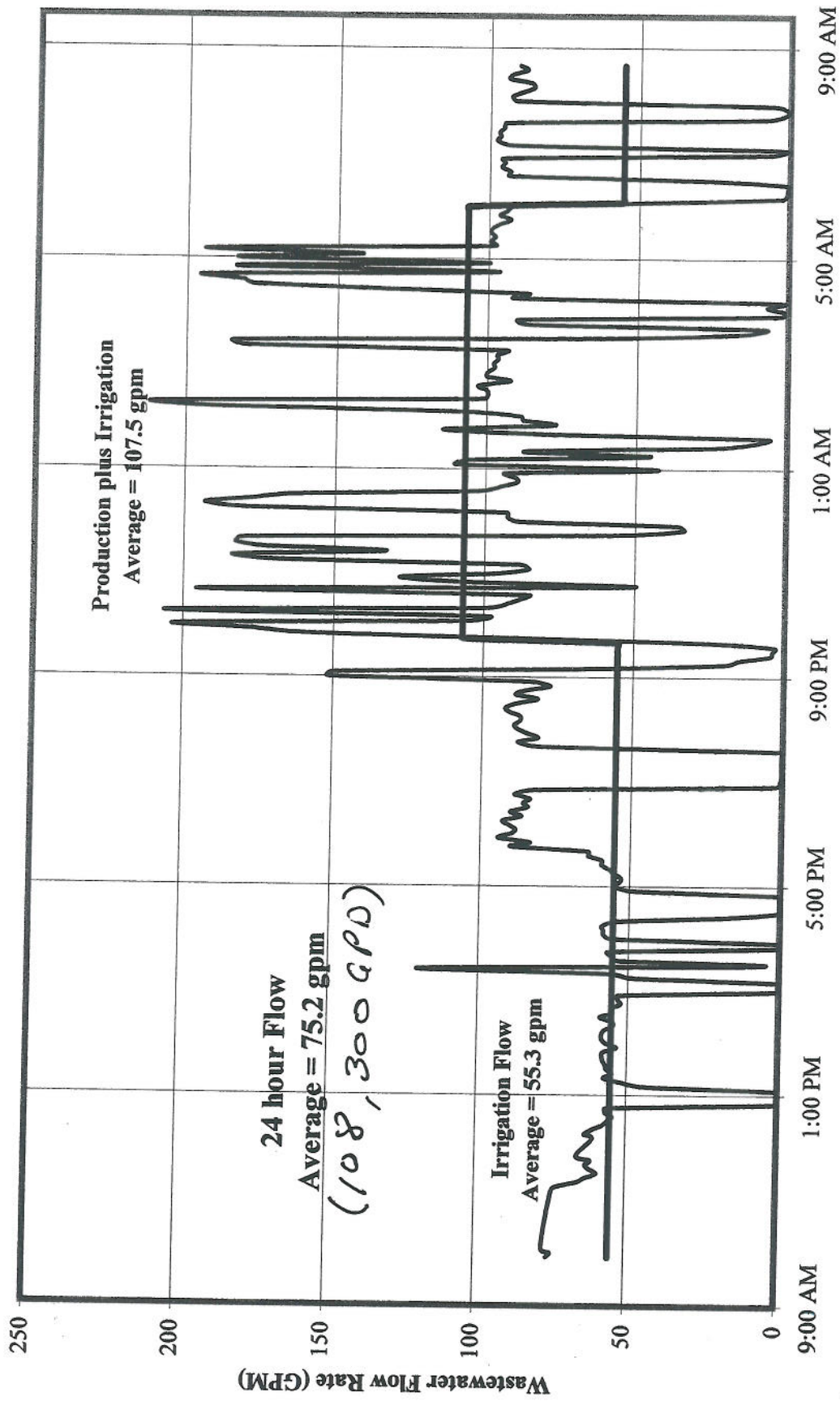
Recommendations: _____

Analyst: J.K.
 Checked By: Jonathan S. Begg
 Laboratory Supervisor

Date: 9-7-2001

Wastewater Data

Chang Farms Flow Data



Time 8 June to 9 June 2004

Table 1. Hourly Averages of WW Flow for the Week of October 13th, 2003.

Hour	October 13 Flow (gpm)	October 14 Flow (gpm)	October 15 Flow (gpm)	October 16 Flow (gpm)	October 19 Flow (gpm)	Average Flow (gpm)
7:00	98.2	115.4	101.9	97.0	88.4	100.2
8:00	90.0	86.8	101.2	76.4	87.4	88.4
9:00	75.2	75.5	67.5	51.9	87.8	71.6
10:00	88.6	87.0	87.8	65.2	86.4	83.0
11:00	27.6	31.3	17.0	11.1	66.2	30.6
12:00	47.6	48.0	50.5	48.6	49.2	48.8
13:00	84.5	82.6	86.1	71.5	86.2	82.2
14:00	78.0	70.7	56.9	47.8	86.4	68.0
15:00	68.5	61.5	64.3	52.2	87.5	66.8
16:00	82.2	78.9	81.3	70.7	89.1	80.4
17:00	41.2	33.9	17.8	13.1	73.8	35.9
18:00	45.7	47.0	49.8	48.4	49.7	48.1
19:00	82.7	83.9	86.3	79.0	88.2	84.0
20:00	104.9	110.2	68.7	58.0	99.4	88.2
21:00	136.9	96.2	116.6	92.3	138.2	116.0
22:00	116.4	126.4	113.1	118.6	141.5	123.2
23:00	98.9	80.3	90.3	70.8	98.4	87.7
0:00	119.3	98.1	98.5	116.9	106.4	107.8
1:00	139.8	135.7	147.5	124.0	173.0	144.0
2:00	104.1	74.1	111.0	59.6	110.2	91.8
3:00	69.2	62.4	67.6	70.3	85.5	71.0
4:00	139.3	119.7	102.6	124.1	117.1	120.6
5:00	84.0	63.6	77.7	76.7	119.3	84.3
6:00	52.3	105.5	93.6	97.2	69.9	83.7

Table 2. Flow for an Average Production Day

Date (7am-7am)	Flow Volume (gpd)
10/13/2003	113,822
10/14/2003	110,302
10/15/2003	100,923
10/16/2003	104,433
10/19/2003	129,744

Table 3. Hourly Averages of WW Temperature for the Week of October 13th, 2003

Hour	October 13 Temp. (°C)	October 14 Temp. (°C)	October 15 Temp. (°C)	October 16 Temp. (°C)	October 19 Temp. (°C)	Average Temp. (°C)
7:00	16.1	15.6	16.3	15.4	15.3	15.8
8:00	15.8	16.6	16.7	14.6	15.7	15.9
9:00	16.3	16.2	16.6	15.1	15.2	15.9
10:00	16.8	16.2	16.9	15.8	15.5	16.2
11:00	17.3	17.3	16.4	15.8	16.7	16.7
12:00	18.3	18.3	16.6	15.8	16.8	17.2
13:00	17.4	17.1	16.4	16.1	15.6	16.5
14:00	18.1	18.6	17.2	16.5	16.4	17.4
15:00	17.8	17.8	16.9	16.8	15.7	17.0
16:00	17.2	17.1	16.9	16.8	16.1	16.8
17:00	17.7	18.1	15.9	16.4	16.7	17.0
18:00	18.8	18.8	15.6	16.2	17.3	17.3
19:00	16.7	16.5	15.8	15.9	15.7	16.1
20:00	17.5	17.9	16.6	15.6	16.0	16.7
21:00	16.2	15.7	15.8	15.0	16.0	15.7
22:00	16.1	15.9	15.6	15.2	15.7	15.7
23:00	15.6	16.3	15.1	14.5	14.7	15.2
0:00	15.3	15.7	15.4	15.1	14.7	15.3
1:00	16.2	15.9	16.3	15.3	17.0	16.2
2:00	16.0	17.0	17.8	14.5	15.8	16.2
3:00	15.9	16.8	16.0	15.0	15.7	15.9
4:00	15.7	16.7	15.6	15.5	15.1	15.7
5:00	15.5	16.0	15.3	14.6	15.7	15.4
6:00	14.5	16.1	15.0	14.5	15.6	15.2

Table 4. Hourly Averages of WW pH for the Week of October 13th, 2003

Hour	October 13 pH	October 14 pH	October 15 pH	October 16 pH	October 19 pH	Average pH
7:00	6.13	6.11	6.02	6.10	5.99	6.1
8:00	6.31	6.08	6.31	6.37	6.06	6.2
9:00	6.14	6.07	6.04	6.12	6.01	6.1
10:00	6.08	6.01	5.96	6.06	6.02	6.0
11:00	6.17	6.13	6.14	6.12	6.05	6.1
12:00	6.22	6.18	6.17	6.19	6.08	6.2
13:00	5.99	5.97	5.94	5.99	5.98	6.0
14:00	6.09	6.04	6.03	6.09	6.03	6.1
15:00	6.08	6.06	6.01	6.04	5.97	6.0
16:00	6.04	5.99	5.95	6.00	5.99	6.0
17:00	6.11	6.11	6.12	6.11	6.01	6.1
18:00	6.17	6.17	6.16	6.19	6.08	6.2
19:00	6.00	5.97	5.92	5.93	5.95	6.0
20:00	6.06	6.05	6.05	6.09	6.08	6.1
21:00	6.19	6.34	6.23	6.22	6.15	6.2
22:00	6.22	6.16	6.25	6.17	6.18	6.2
23:00	6.22	6.32	6.33	6.30	6.32	6.3
0:00	6.30	6.29	6.33	6.25	6.35	6.3
1:00	6.11	6.16	6.17	6.16	6.21	6.2
2:00	6.15	6.21	6.17	6.26	6.29	6.2
3:00	6.06	6.10	6.19	6.13	6.20	6.1
4:00	6.16	6.11	6.16	6.10	6.24	6.2
5:00	6.29	6.27	6.38	6.30	6.28	6.3
6:00	6.27	6.30	6.34	6.46	6.33	6.3

Table 5. Results of Random Dissolved Oxygen and Specific Conductance Measurements.

Date/Time	Dissolved Oxygen (mg/l)	Temp (°C)	Specific Conductance (µs)	Temp (°C)	Comments
10/15/2003 8:33	9.11	14.8	3.5	14.8	
10/15/2003 8:35	10.02	14.9	2.6	14.9	
10/15/2003 15:30	9.88	15.6	1.5	15.5	
10/15/2003 15:50	10.13	14.4	3.7	14.3	
10/16/2003 8:30	8.94	13.4	160.8	13.5	Cleaning, Flow ~200 gpm
10/16/2003 8:50	8.3	14.4	231	14.4	Flow ~80 gpm
10/16/2003 16:07	8.14	14.6	105.2	14.6	
10/16/2003 16:10	8.23	14.6	15.2	14.6	Low Flow <10 gpm
10/17/2003 8:39	7.98	14.4	93.6	14.4	
10/17/2003 8:42	7.97	14.4	81.6	14.4	
10/18/2003 14:40	9.13	14.5	107.4	14.4	
10/18/2003 14:43	9.1	14.4	107.6	14.4	

Table 6. Results of Laboratory Analysis of 24 hr. Composite Samples

Sample Collection Date	Sample Date	Sample Type	Total Coliform (col/100ml)	TSS (mg/l)	Nitrate (mg/l)	Nitrite (mg/l)	Total Phosp. (mg/l)	BOD ₅ (mg/l)	NH ₃ -N (mg/l)	Total Kjeldahl Nitrogen (mg/l)
Associated Detection Limits			0	5	0.5	0.01	1	6	0.1	1.0
2/17/99	N/A	Well Water			10	ND ¹				
8/24/00	N/A	Well Water	0		10.5	0.024				
5/31/01	N/A	Well Water	0		4.3	0.009				
9/6/01	N/A	Well Water	1 ²							
10/30/01	N/A	Well Water	0							

10/14/03	10/13/03	24 hr. Composite	Wrong Dilution	7	9.09	0.014	11.8	9.0	0.12	ND
10/15/03	10/14/03	24 hr. Composite	Wrong Dilution	7	9.1	0.022	11.0	10.3	0.31	ND
10/16/03	10/15/03	24 hr. Composite	7.0E+06	7	9.62	0.042	10.2	12.0	ND	ND
10/17/03	10/16/03	24 hr. Composite	2.7E+06	7	9.19	0.032	10.8	13.0	ND	ND
10/20/03	10/19/03	24 hr. Composite	1.5E+06	9	8.12	0.021	12	13	ND	ND
11/11/03	11/10/03	24 hr. Composite					1.75 ⁴			
Average			3.7E+06	7.4	9.02	0.026	11.2³	11.5	0.22	N/A
Standard Deviation			2.9E+06	0.89	0.55	0.011	0.7	1.8	0.13	N/A
Sample Count			3	5	5	5	5	5	2	N/A

Notes:

1. Detection Limit was 0.5 mg/l
2. 1 colony/ 100ml of Total Coliform (Bacteria N-18)
3. Total Nitrate concentrations are attributed to Chang Farms Well Water, and are not attributed to bean sprout production or cleaning cycles.
4. Detection Limit was 0.20 mg/l.

Table 7. Estimated Mass Loading

Constituents	Estimated Mass Loading	Units
Total Coliform	1.6E+12	col/day
TSS	6.9	lbs/day
NO ₃ -N	8.4	lbs/day
NO ₂ -N	0.024	lbs/day
Total Phosphorous	10.4	lbs/day
BOD ₅	10.7	lbs/day
NH ₃ -N	0.20	lbs/day

Memorandum

To: Mark Krcmarik, Neva Tolopko, The Dennis Group

CC: Matt Chan, Normandeau Associates

From: Don Kretchmer, Normandeau Associates

Date: 6/30/2004

Re: Proposed Chang Farm Discharge

Normandeau has performed a preliminary evaluation of the proposed discharge from the Chang Farm into the Connecticut River. This evaluation included a mass balance of the major constituents of the effluent combining the discharge with the river flow under 7Q10 (the lowest average flow over 7 consecutive days for a 10 year frequency of occurrence) conditions and under average flow conditions. The parameters evaluated were measured in a field program and included pH, total coliform (TC), five day biochemical oxygen demand (BOD5), total suspended solids (TSS), nitrates, nitrites, total phosphorus (TP), ammonia and total kjeldahl nitrogen (TKN). Although effluent temperature and dissolved oxygen were measured, the seasonal variability of these parameters made use of the measured values (from October) for this analysis inappropriate. The parameters and surface water quality standards for Class B waters are summarized in Table 1.

Table 1. Parameters evaluated and Massachusetts Class B surface water quality standards (314 CMR 4.00).

Parameter	Temp Deg F	DO mg/l	pH SU	TC #/100ml	BOD5 mg/l	TSS mg/l	Nitrate mg/l	Nitrite mg/l	TP mg/l	Ammonia mg/l	TKN mg/l
Class B Standard	83 or delta of 3	5.0	6.5- 8.3	NA	NA	Narrative- no impairment of designated uses	NA	NA	NA	NA	NA

The analysis assumed that the discharge would be completely mixed across the river and included no quantitative analysis of a mixing zone. Where ambient river data were readily available, a predicted in-river concentration downstream of the proposed discharge is presented. For most parameters only the predicted change in river concentrations attributable to the discharge of the Chang effluent is presented. Predicted concentrations or changes in concentrations are then compared with "typical concentrations found in river systems in the Northeast.

Effluent concentrations used in the analysis were averages of 5 24-hour composite samples collected by Chang Farms and the Dennis Group in the fall of 2003 (The Dennis Group 2003). Discharge flows were

↳ wasn't more current data available

those proposed for the expanded facility and a Connecticut River outfall. River flows used in the analysis were the 7Q10 and average annual flows at the USGS gage at Montague City just upstream of the proposed discharge.

Ambient river water quality data for the parameters found in the Chang Farms effluent for this reach of the Connecticut River are few. Therefore this analysis is restricted to a predicted change in river concentration attributable to the discharge for most parameters. However, some ambient data are available through monitoring reported by dischargers in the vicinity of the proposed discharge (Kennedy and Weinstein 2000). The data most relevant to evaluating ambient conditions in the vicinity of the proposed Chang Farm discharge are the ambient data reported for the Sunderland wastewater treatment plant. These data were collected across the river from the point of the proposed discharge at the Riverside Cemetery. Data are presented as a range of values for suspended solids, pH and ammonia. The highest value reported was used for this analysis to be conservative. River concentrations for other parameters found in the Chang effluent are not reported.

The results of the analysis are presented in Table 2. pH values in the river range from 7.1 to 7.6 while effluent concentrations range from 5.9 to 6.5. Because pH is measured on a logarithmic scale, the effluent pH is roughly 10 times as acidic as the river. However, mixing the effluent with the river yields very little change in predicted river concentrations attributable to the effluent.

FC
Total coliform concentrations in the effluent are relatively high. As a result the predicted change in concentration in the river is 1153 colonies/100 ml under 7Q10 conditions and 145 colonies/100 ml under average flow conditions. It is notable that although there are no water quality standards for total coliform in Massachusetts, the reach of the river to contain the outfall is listed on the Massachusetts 303D list of water not attaining designated uses and requiring a TMDL for pathogens. → see WQ Assessment report

TN
BOD5 concentrations in the effluent are relatively low so that predicted increases in river concentrations under low and average flow are extremely low. Suspended solids concentrations in the effluent are similar to those observed in the river leading to little change in the river concentration attributable to the proposed effluent. Ammonia concentrations in the effluent are below many of those reported in the river resulting in little change in river concentrations with the addition of the effluent. Nitrate in the effluent resulted in a predicted 0.0028 mg/l change in nitrate concentration in the river under 7Q10 flow conditions. While these increases are modest, there is currently a Connecticut River Nitrogen Project underway at the New England Interstate Water Pollution Control Commission (NEIWPCC). The goal of this program is the development of a Total Nitrogen Reduction Plan for the Connecticut River (NEIWPCC 2003). It is likely that new discharges would be evaluated under such a plan. Increases in river nitrite concentrations were predicted to be inconsequential. TKN concentrations could not be used due to a high laboratory detection limit.

TP
Total phosphorus concentrations in the proposed effluent were relatively high (mean of 11.2 mg/l, The Dennis Group, 2004). As a result predicted concentrations in the river under low flow conditions may be ecologically significant. The predicted change of 0.0035 mg/l to the river under low flow conditions may increase the growth of algae and rooted aquatic plants. ENSR (2001) proposes an instream phosphorus criterion for northeastern rivers of 0.024 mg/l. If the Connecticut River had an ambient concentration close to the criteria, the proposed discharge could increase instream concentrations beyond the criterion under low flow conditions. The predicted change is substantially lower under average flow conditions. True?

Table 2. Mass balance calculations for proposed bean sprout farm effluent discharged to Connecticut River near Whatley, MA.

Parameter	Effluent Concentration	Units	Effluent Flow		Ambient River Concentration ¹	Units	River Flow		Change in River Concentration		Calculated River Concentration	
			GPD	cfs			7Q10 ² cfs	Average ³ cfs	7Q10 Flow mg/l	Average Flow mg/l	7Q10 Flow mg/l	Average Flow mg/l
pH	6.1	SU	350,000	0.542	7.6	SU	1,738	13,790	0.004	0.001	7.596	7.599
Total Coliform	3,700,000	col/100ml	350,000	0.542	0.000	col/100ml	1,738	13,790	1,153	145	na	na
BOD5	11.500	mg/l	350,000	0.542	0.000	mg/l	1,738	13,790	0.0036	0.0005	na	na
TSS	7.400	mg/l	350,000	0.542	11.000	mg/l	1,738	13,790	0.0023	0.0003	10.999	11.000
Nitrate	9.020	mg/l	350,000	0.542	0.000	mg/l	1,738	13,790	0.0028	0.0004	na	na
Nitrite	0.026	mg/l	350,000	0.542	0.000	mg/l	1,738	13,790	0.0000	0.0000	na	na
Total Phosphorus	11.200	mg/l	350,000	0.542	0.000	mg/l	1,738	13,790	0.0035	0.0004	na	na
Ammonia	0.220	mg/l	350,000	0.542	0.160	mg/l	1,738	13,790	0.0001	0.0000	0.160	0.160
Total Kjeldahl Nitrogen	<1.0	mg/l	350,000	0.542	0.000	mg/l	1,738	13,790	na	na	na	na

¹ at Riverside Cemetery

² 7Q10 flow at Montague City

³ Average flow for period of record, October 1939-Sept 1985. (Simcox 1992)

Sources

- 314 CMR 4.00. Massachusetts Surface Water Quality Standards.
- The Dennis Group. 2003. Business Plan, Chang Farms, Inc, version 1. Prepared for; Chang Farms, Inc. Whatley, MA.
- ENSR 2001. The Relationship Between Nutrient Concentrations and Periphyton Levels in Rivers and Streams – A Review of Scientific Literature. Prepared for; New England Interstate Water Pollution Control Commission.
- NEIWPC. 2003. Connecticut River Nitrogen Project, Workgroup Workplan.
- Simcox, A. C., 1992, Water resources of Massachusetts: U.S. Geological Survey Water Resources Investigations Report 90-4144, 94p.

Table 1. Chemical Usage at Chang Farms.

Usage	Product Name	Chemical Composition	Estimated Usage
Nutrients	B88	Phosphoric Acid (2.0%) Soluble Potash (1.0%) Calcium Carbonate (2.0%)	0.5 gallons per day
	P1	Hydrochloric Acid	
Cleaning	F-182A Liquid Chlorinated Alkaline Foam Cleaner	Sodium Hydroxide (5%) Sodium Hypochlorite (1.5%) Chlorine	1.0 gallon per day
Cleaning	F-48 Liquid Acid Cleaner and Sanitizer	Quaternary Ammonium (7%) Phosphoric Acid (30%) Ethyl Alcohol (2%)	8 oz per day
Cleaning	Super Lime-Sol	Phosphoric Acid (56%) Detergents (5%)	4 gallons per year
Cleaning	Powder Bleach	Sodium Hypochlorite	2 lbs/day

B88 INC.

Malvern Town Center, P.B. No. 375530
31 Tapscott Road, Scarborough, Ontario
Canada M1B 2C0

Emergency Numbers:

Canada: (613) 996-6666

Poison Control Centre: 598-5900

MATERIAL SAFETY DATA SHEET**PRODUCT IDENTIFICATION**

Product Name: B88 Plant Nutrient Solution
Chemical Name: Potassium orthophosphate, mono-H
Synonyms: Dipotassium phosphate
Chemical Family: Inorganic salt
Formula: Non-published

HAZARDOUS INGREDIENTS OF MATERIALS

Notic	%	LD ₅₀	TLV/TWA (mg/m ³)	CAS NO.
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Not a controlled product

PHYSICAL PROPERTIES

Appearance and Odor: Clear Solution
Boiling Point / Range: Not applicable information
Melting / Freezing Point: Not applicable information
Vapour Pressure: Not applicable information
Specific Gravity: 2.3
Vapour Density: Not applicable information
Evaporation Rate: Not applicable information
Solubility: 150gm / 100c.c.
% Volatile by Volume: Not applicable information

FIRST AID PROCEDURES

Inhalation: Remove to fresh air.
Contact with Skin: Wash with soap and water.
Contact with Eyes: Flush with running water for at least 15 minutes. Call a physician.
Ingestion: Induce vomiting immediately by giving 2 glasses of water and sticking a finger down throat. Call a physician. Never give anything by mouth to an unconscious person.
Other Medical Care: Not available / reported

P-1 PHOSPHORIC ACID 2.0%
SOLUBLE POTASH 1.0%
CALCIUM Ca 2.0% Ca^{+2}

P2.05
K2O

REACTIVITY DATA

Stability:	Stable
Hazardous Polymerization:	Will not occur
Conditions to Avoid:	Prolonged exposure to air
Materials to Avoid:	Not known
Hazardous Decomposition or Combustion Products:	None

FIRE AND EXPLOSION DATA

Flash Point (method):	Not flammable
Flammability Limits in air:	UEL(%): Not applicable LEL(%): Not applicable
Fire Extinguishing Media:	Dry chemical, CO ₂ water spray or foam
Fire Fighting Procedures:	None
Other Fire or Explosion Hazards:	Not known

TOXICOLOGICAL AND HEALTH DATA

Recommended Exposure Limit (AOGIH TLV-TWA):	Not reported
Toxicological Data:	Not reported
Carcinogenicity Data:	Not reported adverse effects
Reproductive Effects:	Not reported adverse effects Not reported
Mutagenicity Data:	Not reported adverse effects Not reported
Teratogenicity Data:	Not reported adverse effects Not reported
Synergistic Materials:	Not reported adverse effects
Effects of Exposure:	
Inhalation:	None reported
Skin Contact:	None reported
Eye Contact:	None reported
Ingestion:	None reported
Other Health Effect:	Potassium phosphate does not present any serious health hazard in normal industrial use.

PREVENTATIVE MEASURES

Engineering Controls:	Not applicable
Respiratory Protection:	Not applicable
Skin Protection:	Rubber gloves
Eye Protection:	Safety glasses or goggles
Other Personal Protective Equipment:	Not applicable
Handling Procedures and Equipment:	Not applicable
Storage Requirements:	Keep containers tightly closed
Other Precautions:	None
Steps to be taken in the event of a spill or leak:	Shovel into suitable container for disposal. Wash residue thoroughly with water.
Environmental Effects:	Not available / reported
Deactivating Chemicals:	Not applicable
Waste Disposal Methods:	In accordance with federal, provincial, state, and local regulations on chemical waste disposal

MATERIAL SAFETY DATA SHEET

0-2-1

**Bean Seed Dressing and Plant Nutrient Solution
July 23, 2003****I. Product Information**

Manufacturer: Calco (Taiwan) Marketing Services, Inc.
3988 Clay Street
Houston, TX 77023
713-247-9918

Trade Name: **PRODUCT P-1™**

II. Hazardous Ingredients: Contains hydrochloric acid**III. Physical Data**

Physical form – Liquid
Solubility – Miscible in water
Color – Slight yellow color

IV. Fire and Explosion Data

Not considered to be fire or explosion hazard. If in vicinity of fire, use appropriate methods to control source of fire..

V. Health Hazard Information:

Health Rating: 1 – Slight
Flammability Rating: 0 – None
Reactivity Rating: 2 – Moderate
Contact Rating: 1 – Slight (Corrosive)

Potential Health Effects: May cause minor skin, eye and respiratory irritation. Ingestion may cause gastrointestinal tract irritation, nausea, vomiting and diarrhea.

First Aid Procedures:

Inhalation – Move to fresh air. Get medical attention for any breathing difficulty.
Ingestion – If large amounts swallowed, give water to drink and seek medical advice.
Skin Contact – Wash with soap and water. Seek medical advice if irritation develops.
Eye Contact – Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Seek medical attention if irritation persists.

VI. Storage and Handling:

Store in clean dry area and out of sunlight. If spilled, wash to sewer with water. Avoid hand/mouth/eye contact. Gloves and goggles are recommended when handling this product.



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585-336-2200 • Fax: 585-336-2357
www.rochestermidland.com

F-182A

LIQUID CHLORINATED ALKALINE FOAM CLEANER



FEATURES:

- Concentrated caustic, chlorinated foam cleaner.
- Proprietary blend of surfactants, polymers, detergents, alkaline builders, and chlorine.
- USDA authorized in Category A-1. Potable water rinse required.
- Outstanding multipurpose foam cleaner for equipment, plant work surfaces, ceilings, walls, and floors.
- Produces dense foam when used with foam generating equipment.
- Hard water tolerant.
- Free rinsing.
- Biodegradable.

BENEFITS:

- Maximized cleaning results combined with low usage costs.
- Designed for use in all food industries including bakeries, dairies, seafood, meat processors, fruit and vegetable packers; and canneries.
- Outstanding rinseability leaving no films on equipment or surfaces.
- Safe on stainless steel with use dilution rates of 1:10 to 1:50.
- Chlorination improves destaining and cleaning action.
- Dense foam adheres to horizontal and vertical surfaces long enough to emulsify and dissolve soil deposits.
- Removes fat, oil, protein and starch soils, as well as mold and soap scum.
- Easily dispensed and portion controlled.
- Convenient and economical with outstanding results.
- Provides outstanding results with broad application on plant surfaces.

DESCRIPTION:

F-182A is a concentrated liquid chlorinated alkaline foam cleaner designed for use in all food industries. Convenient and economical, it effectively removes fats, oils, protein, starch, mold, and soap scum. Using foam generators, dense foam production provides a concentrated cleaner that clings to horizontal and vertical surfaces of equipment, ceilings, walls, floors, and plant work areas. F-182A is hard water tolerant, free rinsing, and biodegradable. Recommended for use in all food industries, including bakeries, dairies, seafood, meat processors, fruit and vegetable packers, and canneries. Chlorination improves de-staining and cleaning action. Authorized by the USDA for use in Federally inspected meat and poultry

processing plants in Category A-1. Certified Kosher.

DIRECTIONS FOR USE:

Food Processing Areas: 1. Cover or remove all food products from areas to be cleaned. 2. Remove gross accumulation of meat particles, soil, and other waste materials from surfaces and equipment. High pressure sprayer or hose nozzle with hot water may be used if desired. 3. **Foam Application:** Dilute 1:10 to 1:50. Adjust foam generating equipment to produce thick, dense foam. Apply foam to all surfaces to be cleaned. Let stand 5 to 10 minutes. Rinse with potable water. 4. **Manual Application:** by mop brush or sponge. Use 1 part F-182A to approximately 18 to 50 parts medium-hot water. Apply to surface and let stand 5 to 10 minutes. Rinse with potable water. 5. **Soak Application:** Use 1 part F-182A to approximately 10 to 25 parts medium-hot water. Let soak until clean. Rinse with potable water. Rinse away all cleaner after use. Use potable water with either high pressure sprayer or hose nozzle. Allow surface to drain dry. Do not wipe dry. Tilt movable surfaces to assist water run-off. Use Test Kit RF-2000-7.

PROPERTIES:

Biodegradable:	..... Yes	Pounds/Gallon:	..... 9.0
Rinsing:	..... Complete	Viscosity:	..... 3-5 cps
Foam Generation:	..... Dense and profuse	Recommended Use Temp:	..... 70-120°F
Hard Water Tolerance:	..... Stable	Flash Point:	..... None
Emulsification/Solubility:	..... Rapid	Conductivity at 1%:	..... 3390 µS/cm
pH:	..... 14	VOC:	..... None
Chlorine % as		Metal Safety:	..... Attacks Al & Zn
Sodium Hypochlorite:	..... 1	Storage:	..... Avoid freezing
pH 1%:	..... 11.6-12.0		
Specific Gravity:	..... 1.08		
Sodium Hydroxide %:	..... 5		
Appearance:	..... Clear light amber liquid		
Odor:	..... slight chlorine odor		

PACKAGING:

Available in totes, 55 gallon drums and 5 gallon pails

For handling and precautionary information, reference the product label and material safety data sheet.

All data statements and information presented herein are believed to be accurate and reliable but are not to be taken as a guarantee, express warranty or implied warranty or merchantability or fitness for a particular purpose, or representation, express or implied, for which seller assumes legal responsibility, and they are offered solely for your consideration, investigation and verification. Statements or suggestions concerning possible use of this product are made without representation or warranty that any such use is free of patent infringement and are not recommendations to infringe on any patent. Printed in USA. Copyright © 2001 Rochester Midland Corporation.

Form # 1429-N (Rev. 3/8/99)



MATERIAL SAFETY DATA SHEET

333 Hollenbeck St.
Rochester NY 14621
Information: 585-336-2200

Emergency Phone:
INFOTRAC: 1-800-535-5053
OUTSIDE US: 1-352-323-3500

PRODUCT NAME:

F-182A, Chlorinated High Foaming Cleaner

REVISION DATE:

03/17/2003

REVISION NUMBER:

4

DATE PRINTED:

03/18/2003

PREPARED BY:

EH&S DEPARTMENT

1. CHEMICAL PRODUCT

MSDS FORM NUMBER: 5079

NFPA/HMIS HAZARD CODES (minimal=0; slight=1; moderate=2; serious=3; severe=4)

Health: 3/3
Fire: 0/0
Reactivity: 1/1
Special/Protective ALK/C
Equipment:

2. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Components

PRODUCT COMPOSITION CAS REGISTRATION NO.	APPROX. WEIGHT PERCENT	ACGIH TLV	ACGIH UNIT	OSHA PEL	OSHA UNIT	SARA 313 Reportable
SODIUM HYDROXIDE 1310-73-2	5 max.	2	mg/M3 (ceiling)	2	mg/M3 (ceiling)	No
Sodium hypochlorite 7681-52-9	1.5 max.	NA	NA	NA	NA	No

3. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (F): As water (C) NA
VAPOR PRESSURE: As water
VAPOR DENSITY (AIR=1): As water
SOLUBILITY IN WATER: COMPLETE
SPECIFIC GRAVITY: 1.08 +/- 0.01
VOC Content (%): NE
VOV Content (%): NE
EVAPORATION RATE: As water
PH: > 14
APPEARANCE AND ODOR: Clear amber liquid. Slight chlorine odor.

4. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (F):

None (C): NA

METHOD:

None

F-182A, Chlorinated High Foaming Cleaner

FLAMMABLE LIMITS IN AIR - LOWER (%): NA

FLAMMABLE LIMITS IN AIR - UPPER (%): NA

EXTINGUISHING MEDIA: Water. Carbon dioxide.

FIRE FIGHTING PROCEDURES: Corrosive material. Avoid exposure to mist and splashes. Fire-fighters should wear self-contained breathing apparatus and full protective clothing when fighting chemical fires. Cool exposed containers with water spray.

5. STABILITY AND REACTIVITY

STABILITY DATA: STABLE

POLYMERIZATION: Will Not Occur.

HAZARDOUS DECOMPOSITION: Chlorine gas. Oxygen.

INCOMPATIBILITY (MATERIALS TO AVOID): Mix only with water. Contact with acids and acid-containing cleaners, such as rust removers, vinegar, and toilet bowl cleaners may generate hazardous gases, such as chlorine, along with heat. Interaction with ammonia-containing materials may liberate ammonia gas or chloramine derivatives of ammonia. Avoid: Contact with ammonia. Contact with acids. Avoid contact with: Organic matter. Reducing agents. Avoid contact with aluminum, zinc, other soft metals or galvanized metals. Reaction will generate hydrogen gas. This gas is flammable and/or explosive in presence of ignition source.

CONDITIONS/HAZARDS TO AVOID: None.

6. HAZARDS IDENTIFICATION**EFFECTS FROM ACUTE EXPOSURE:****INGESTION:**

Severe burns to mucous membranes of mouth, throat and digestive tract.

SKIN CONTACT:

Causes moderate skin irritation. Prolonged contact causes severe burns which may not be immediately painful or visible.

INHALATION:

Inhalation of spray mist may be irritating. Possible damage to mucous membranes of nose and throat.

EYE CONTACT:

Causes severe eye burns. May cause permanent eye damage. May cause blindness.

F-182A, Chlorinated High Foaming Cleaner**CHRONIC EFFECTS:**

Dermatitis. Possible respiratory damage from inhalation of dust or mist.

EFFECTS/CARCINOGENICITY:

None listed under OSHA, IARC, or NTP.

ROUTES OF ENTRY:

Routes of entry for solids and liquids include eye and skin contact, ingestion and inhalation.

EMERGENCY AND FIRST AID MEASURES:

INGESTION: Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person. **SKIN:** Flush with water for at least 15 minutes while removing all contaminated clothing and shoes. Continue rinsing until "slippery" feeling is gone. Get medical attention if irritation or burns develop. **INHALATION:** If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention. **EYES:** In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

NOTES TO PHYSICIAN: None.

7. HANDLING AND STORAGE**SPILL PROCEDURES:**

SMALL SPILLS: Reclaim as much as possible.

LARGE SPILLS: Dike to contain. Pick up with absorbant material. Put in suitable container for disposal. Flush remainder with water.

WASTE DISPOSAL METHODS:

Dispose in accordance with Federal, State and Local regulations. Protect all personnel against release of chlorine gas.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

DANGER: Concentrated, alkaline liquid. Avoid contact with eyes, skin and clothing. Do not breathe mist or vapors. Store only in original container and keep closed. Store in a well ventilated area. Contents may develop pressure upon prolonged storage; loosen closure cautiously before opening. Mix only with water.

OTHER PRECAUTIONS:

Do not reuse container. Empty containers may retain product residue, follow MSDS/label precautions even after container is emptied. Contact with certain food sugars can release hazardous amounts of carbon monoxide gas in enclosed vessels. Read and follow label instructions.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION**EXPOSURE CONTROLS:**

Use in a well ventilated area.

RESPIRATORY PROTECTION:

Not normally required. If product is used in a manner which creates dust or mist above recommended exposure limits, a NIOSH/MSHA approved respirator with dust/mist filter may be needed in the absence of proper environmental

F-182A, Chlorinated High Foaming Cleaner

PROTECTIVE GLOVES:

controls.

EYE PROTECTION:

Rubber or plastic gloves recommended to minimize skin contact.

OTHER PERSONAL PROTECTION

Goggles. Face shield.

EQUIPMENT:

Rubber boots. Appropriate protective clothing as needed to prevent skin contact. Liquid may penetrate leather shoes and cause delayed burns. Eyewash fountains and safety showers must be easily accessible.

VENTILATION:

General mechanical and/or local exhaust as needed to meet exposure limits if mist in air. Corrosion resistant equipment recommended.

Health and safety information presented on this form is generally applicable at recommended dilutions, varying only in degree. This information was compiled from current, reliable sources and is believed to be correct. As data, and/or regulations change, and conditions of use and handling are beyond our control, no warranty, express or implied, is made as to completeness or continuing accuracy of this information.

*** END OF MSDS ***



333 Hollenbeck Street • Rochester, NY 14621 USA
585-336-2200 • Fax: 585-336-2357
www.rochestermidland.com

F-48 LIQUID ACID CLEANER AND SANITIZER



FEATURES:

- Complex blend of four quaternary ammonium compounds and 30% phosphoric acid.
- Powerful acid cleaner and sanitizer recommended for use in every type of food processing operation.
- USDA authorized in Category D2.
- Hard water tolerant up to 600 ppm.
- Low foam.
- Non-corrosive.
- Non-irritating.
- Biodegradable.

BENEFITS:

- Provides an acid wash and a sanitizing rinse in one step with appropriate dilution strengths.
- May be used on walls, ceilings, and other non-food contact surfaces to control mold growth.
- Phosphoric acid content reduces scale, milkstone, beerstone, and hard water film build-up.
- Phosphoric acid content brightens stainless steel.
- Applied manually or through proportioning equipment and sprayers.
- Non-irritating to skin and mucous membranes in dilution.
- Effective against *Campylobacter jejuni*, *Escherichia coli* 0157:H7, *Listeria Monocytogenes*, *Salmonella enteritidis*.

DESCRIPTION:

F-48 is a liquid acid cleaner and sanitizer. It is a complex blend of four quaternary ammonium compounds and 30% phosphoric acid. F-48 is a powerful sanitizer recommended for use in all food processing facilities. It is non-corrosive, non-irritating, and biodegradable. In many food processing operations, with the appropriate dilution strength, it provides an acid wash and a sanitizing rinse in one step. The phosphoric acid brightens stainless steel and reduces scale, milkstone, beerstone, and hard water film build-up on equipment and surfaces. Authorized by the USDA for use in Federally inspected meat and poultry processing plants in Category D2. Certified Kosher. Currently holds CFIA Letter of Non-Objection.

DIRECTIONS FOR USE:

Food Processing Equipment: First remove soils, clean

using a detergent and rinse. With a solution of 1 ounce of F-48 in 4 gallons (512:1) of water (150 ppm active), apply with a cloth, brush, mechanical spray equipment, or by immersion. F-48 does not require a rinse from food contact surfaces in this dilution. When sprayed on walls, ceilings, and other non-food contact surfaces F-48 is recommended in a 1 ounce per gallon (128:1) solution. Those surfaces need not be rinsed. It can be used manually, through proportioning equipment or Dema injectors.

In the Hydro Sprayer 380 ST use the olive green metering tip to reach the desired dilution of 512:1 at 60 psi. Use the red-purple tip to reach a dilution of 512:1 at 40 psi. Use Quaternary Test Kit K-1582.

PROPERTIES:

Biodegradable:	Yes	Conductivity of	
Wetting Action:	Rapid	1% Solution:	5.6 µS/cm
Foam Generation:	Low	VOC%:	None
Hard Water		Metal Safety:	Will etch aluminum & galvanized
Tolerance:	Up to 600 ppm hardness	Recommended Use Temp:	50 - 100°F
Solubility:	Complete	Flash Point TCC:	None
pH:	0.7 - 1.0	Storage:	Avoid Freezing
Specific Gravity:	1.170	Shelf Life:	5 years
pH 1%:	2.1	Appearance:	Clear red liquid
Viscosity @ 75°F:	15 cps	Odor:	mild odor
Pounds/Gallon:	9.7		

Active Ingredients

	% By Wt.
Octyl decyl dimethyl ammonium chloride:	2.2950
Didecyl dimethyl ammonium chloride:	1.377
Dioctyl dimethyl ammonium chloride:	0.918
Alkyl dimethyl benzyl ammonium chlorides:	3.0600

PACKAGING:

Available in 55 gallon drums, 5 gallon pails, 4x1 gallon cases, and 1 gallon containers

For handling and precautionary information, reference the product label and material safety data sheet.

All data statements and information presented herein are believed to be accurate and reliable but are not to be taken as a guarantee, express warranty or implied warranty or merchantability or fitness for a particular purpose, or representation, express or implied, for which seller assumes legal responsibility, and they are offered solely for your consideration, investigation and verification. Statements or suggestions concerning possible use of this product are made without representation or warranty that any such use is free of patent infringement and are not recommendations to infringe on any patent. Printed in USA. Copyright © 2001 Rochester Midland Corporation.

Form # 1046-H (Rev. 8/22/01)

MATERIAL SAFETY DATA SHEET



333 Hollenbeck St.
Rochester NY 14621
Information: 585-336-2200

Emergency Phone:
INFOTRAC: 1-800-536-5053
OUTSIDE US: 1-352-323-3500

PRODUCT NAME: F-48, No Rinse Acid Cleaner Sanitizer

REVISION DATE: 10/29/2001 **REVISION NUMBER:** 3
DATE PRINTED: 03/13/2002 **PREPARED BY:** Walter Friedlander

1. CHEMICAL PRODUCT

MSDS FORM NUMBER: 5036
NFPA/HMIS HAZARD CODES (minimal=0; slight=1; moderate=2; serious=3; severe=4)

Health: 3/3
Fire: 0/0
Reactivity: 1/1
Special/Protective Acid/C
Equipment:

2. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Components

PRODUCT COMPOSITION CAS REGISTRATION NO.	APPROX. WEIGHT PERCENT	ACGIH TLV	ACGIH UNIT	OSHA PEL	OSHA UNIT
Phosphoric acid 7664-38-2	30	1	mg./M3	1	mg./M3
Dialkyl dimethyl ammonium chlorides - irritant 139-08-2	4.59	NA	NA	NA	NA
Alkyl dimethyl benzyl - ammonium chlorides - irritant 68424-95-3	3.06	NA	NA	NA	NA
ETHYL ALCOHOL 64-17-5	2 max.	1000	PPM	1000	PPM

3. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (F): 210 F (C) NA
VAPOR PRESSURE: As water
VAPOR DENSITY (AIR=1): As water
SOLUBILITY IN WATER: COMPLETE
SPECIFIC GRAVITY: 1.170 +/- 0.005
VOC Content (%): NE
EVAPORATION RATE: less than water
PH: (1:512 in water) 2.3 - 2.7

F-48, No Rinse Acid Cleaner Sanitizer**APPEARANCE AND ODOR:**

Light pink liquid.

4. FIRE AND EXPLOSION HAZARD DATA**FLASH POINT (F):**

None (C): NA

METHOD:

None

FLAMMABLE LIMITS IN AIR - LOWER (%):

NA

FLAMMABLE LIMITS IN AIR - UPPER (%):

NA

EXTINGUISHING MEDIA:

As for surrounding fire. Product will not burn.

FIRE FIGHTING PROCEDURES:

Corrosive material. Avoid exposure to mist and splashes. Fire-fighters should wear self-contained breathing apparatus and full protective clothing when fighting chemical fires. Cool exposed containers with water spray.

5. STABILITY AND REACTIVITY**STABILITY DATA:**

STABLE

POLYMERIZATION:

Will Not Occur.

HAZARDOUS DECOMPOSITION:

If evaporated to dryness, as in a fire, may release: Soot. Smoke. Carbon Monoxide. Oxides of Phosphorus. Oxides of Nitrogen.

INCOMPATIBILITY (MATERIALS TO AVOID):

Do not mix with: Alkalines. Chlorine containing materials. Peroxides. Reducing agents. Avoid contact with aluminum, zinc, other soft metals or galvanized metals.

CONDITIONS/HAZARDS TO AVOID:

None.

6. HAZARDS IDENTIFICATION**EFFECTS FROM ACUTE EXPOSURE:****INGESTION:**

Severe burns to mucous membranes of mouth, throat and digestive tract.

SKIN CONTACT:

Causes moderate skin irritation. Prolonged contact causes severe burns which may not be immediately painful or visible.

INHALATION:

Inhalation of spray mist may be irritating. Possible damage to mucous membranes of nose and throat.

EYE CONTACT:

Causes severe eye irritation. Causes severe eye burns. May cause permanent eye damage. May

F-48, No Rinse Acid Cleaner Sanitizer

cause blindness.

CHRONIC EFFECTS:

Dermatitis. Possible respiratory damage from inhalation of dust or mist.

EFFECTS/CARCINOGENICITY:

None listed under OSHA, IARC, or NTP.

ROUTES OF ENTRY:

Routes of entry for solids and liquids include eye and skin contact, ingestion and inhalation.

EMERGENCY AND FIRST AID MEASURES:

INGESTION: Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person. **SKIN:** Flush with water for at least 15 minutes while removing all contaminated clothing and shoes. Get medical attention if irritation or burns develop. **INHALATION:** If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention. **EYES:** Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

NOTES TO PHYSICIAN: None.

7. HANDLING AND STORAGE**SPILL PROCEDURES:**

SMALL SPILLS: Pick up with absorbant material. Flush residue with water.

LARGE SPILLS: Dike to contain. Pick up with absorbant material. Put in suitable container for disposal. Flush remainder with water.

WASTE DISPOSAL METHODS:

Dispose in accordance with Federal, State and Local regulations.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

DANGER: Concentrated acidic liquid. Avoid contact with eyes, skin and clothing. Do not breathe mist or vapors. Store only in original container and keep closed. Store in a cool, dry area. Store in a well ventilated area. Mix only with water.

OTHER PRECAUTIONS:

Do not reuse container. Read and follow label instructions. Keep out of reach of children.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION**EXPOSURE CONTROLS:****RESPIRATORY PROTECTION:**

Use in a well ventilated area.

None normally required. Use NIOSH approved acid respirator with dust/mist filter if spray mist in air exceeds exposure limits.

PROTECTIVE GLOVES:

Rubber or plastic gloves recommended to minimize skin contact.

EYE PROTECTION:

Goggles. Face shield.

OTHER PERSONAL PROTECTION**EQUIPMENT:**

Rubber boots. Appropriate protective clothing as needed to prevent skin contact. Liquid may penetrate leather shoes and cause delayed burns. Eyewash fountains and safety

F-48, No Rinse Acid Cleaner Sanitizer**VENTILATION:**

showers must be easily accessible.
Not normally required. General mechanical and/or local exhaust as needed to meet exposure limits if mist in air. Corrosion resistant equipment recommended. When cleaning aluminum or galvanized surfaces, use explosion proof equipment to remove any hydrogen gas.

Health and safety information presented on this form is generally applicable at recommended dilutions, varying only in degree. This information was compiled from current, reliable sources and is believed to be correct. As data, and/or regulations change, and conditions of use and handling are beyond our control, no warranty, express or implied, is made as to completeness or continuing accuracy of this information.

***** END OF MSDS *****



333 Hollenbeck Street • Rochester, NY 14621 USA
585-336-2200 • Fax: 585-336-2357
www.rochestermidland.com

SUPER LIME SOL

LIQUID PHOSPHORIC
ACID FOAM CLEANER



FEATURES:

- Multi-purpose acid foam cleaner containing detergents, surfactants, and wetting agents.
- USDA authorized in Category A-3, for use as an acid cleaner in all departments. Potable water rinse required on food contact surfaces.
- Removes stains, lime scale, food soils, rust, mold, and soap film found in dairy, beverage, and other food processing operations.
- Produces a dense foam.
- Product "inhibited" to protect ferrous metal surfaces.
- Biodegradable.
- Color coded red for identification and safety.

BENEFITS:

- Broad based application in the food processing industry.
- Outstanding applications using foam generating equipment and manual cleaning procedures.
- Very effective for removal of rust stains and hard water deposits.
- Safe on stainless steel, steel, ceramic, and porcelain surfaces.
- Rinsability is rapid and complete.
- Concentrated for cost effectiveness.

DESCRIPTION:

SUPER LIME-SOL is a liquid phosphoric acid foam cleaner formulated with detergents, surfactants, and wetting agents. It is designed to remove rust, heavy scale deposits, mold and mildew stains, starch and protein from equipment found in industrial, institutional, and food processing plants. **SUPER LIME-SOL** is free rinsing, biodegradable, and color coded for identification and safety. It has applications in dairy, beverage, and other food processing operations. **SUPER LIME-SOL** will not harm stainless steel, ceramic, and porcelain surfaces. It is not recommended for use on aluminum or galvanized surfaces. Dense foam clings to vertical and horizontal surfaces. **SUPER LIME-SOL** is a more concentrated version of Lime-Sol. Authorized by the USDA for use in Federally inspected meat and poultry processing plants in Category A-3. Certified Kosher.

DIRECTIONS FOR USE:

Dilution ratios will vary depending upon soil conditions. A dilution of 1 part **SUPER LIME-SOL** to 5 parts water is recommended for heavy scale accumulations. Adjust to a higher or lower dilution as necessary. Dilute at a ratio of 1:12 and apply through a foamer for use as a stainless steel brightener. Recommended use temperature is 140°F to 150°F. May be used in any RMC foam generating equipment or manually. Do not mix with chlorine. Do not use on galvanized surfaces. Potable water rinse is required. Use Test Kit RF-1000-7.

PROPERTIES:

Biodegradable:.....	Yes	Density:.....	11.4 lbs./gal.
Rinsing:.....	Excellent	Viscosity:.....	10-20 cps
Foam Generation:.....	Dense, clinging	Recommended Use Temp:.....	70-150°F
Hard Water Tolerance:.....	Stable	Flash Point:.....	None
Emulsification/Solubility:.....	Good	Conductivity of	
pH:.....	1-2	1% Solution:.....	5680 µS/cm
Specific Gravity @ 70°F:.....	1.370	VOC %:.....	None
pH 1%:.....	2-2.5	Metal Safety:.....	Etches Al & Zn
Appearance:.....	Clear red liquid	Storage:.....	Avoid freezing
Odor:.....	odorless	Shelf Life:.....	Over 5 years

PACKAGING:

Available in totes, 55 gallon drums, and 1 gallon containers

For handling and precautionary information, reference the product label and material safety data sheet.

All data statements and information presented herein are believed to be accurate and reliable but are not to be taken as a guarantee, express warranty or implied warranty or merchantability or fitness for a particular purpose, or representation, express or implied, for which seller assumes legal responsibility, and they are offered solely for your consideration, investigation and verification. Statements or suggestions concerning possible use of this product are made without representation or warranty that any such use is free of patent infringement and are not recommendations to infringe on any patent. Printed in USA. Copyright © 2001 Rochester Midland Corporation.

Form #1433-PLIT (REV. 02/2/00)

MATERIAL SAFETY DATA SHEET



333 Hollenbeck St.
Rochester NY 14621
Information: 585-336-2200

Emergency Phone:
INFOTRAC: 1-800-535-5053
OUTSIDE US: 1-352-323-3500

PRODUCT NAME:**SUPER LIME-SOL, Liquid Phosphoric Acid Foam Cleaner**

REVISION DATE:	03/21/2003	REVISION NUMBER:	3
DATE PRINTED:	03/21/2003	PREPARED BY:	EH&S DEPARTMENT

1. CHEMICAL PRODUCT

MSDS FORM NUMBER: 5072

NFPA/HMIS HAZARD CODES (minimal=0; slight=1; moderate=2; serious=3; severe=4)

Health: 3/3
Fire: 0/0
Reactivity: 1/1
Special/Protective Acid/C
Equipment:

2. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Components

PRODUCT COMPOSITION CAS REGISTRATION NO.	APPROX. WEIGHT PERCENT	ACGIH TLV	ACGIH UNIT	OSHA PEL	OSHA UNIT	SARA 313 Reportable
Phosphoric acid 7664-38-2	56	1	mg./M3	1	mg./M3	No
Detergents MIXTURE	1-5	NA	NA	NA	NA	No

3. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT (F): 245 approx. (C) NA
VAPOR PRESSURE: As water
VAPOR DENSITY (AIR=1): As water
SOLUBILITY IN WATER: COMPLETE
SPECIFIC GRAVITY: 1.370
VOC Content (%): NE
VOV Content (%): NE
EVAPORATION RATE: Less than water
PH: < 0
APPEARANCE AND ODOR: Clear red. Odorless.

4. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (F): None (C): NA
FLAMMABLE LIMITS IN AIR - LOWER (%): NA

SUPER LIME-SOL, Liquid Phosphoric Acid Foam Cleaner

FLAMMABLE LIMITS IN AIR - UPPER (%): NA

EXTINGUISHING MEDIA: Product will not burn.

FIRE FIGHTING PROCEDURES: Corrosive material. Avoid exposure to mist and splashes. Cool exposed containers with water spray after extinguishing fire. Fire-fighters should wear self-contained breathing apparatus and full protective clothing when fighting chemical fires.

5. STABILITY AND REACTIVITY

STABILITY DATA: STABLE

POLYMERIZATION: Will Not Occur.

HAZARDOUS DECOMPOSITION: If evaporated to dryness, as in a fire, material may burn, releasing: Soot. Smoke. Carbon Monoxide. Oxides of Phosphorus.

INCOMPATIBILITY (MATERIALS TO AVOID): Contact with basic agents. Chlorine containing materials. Avoid contact with aluminum, zinc, other soft metals or galvanized metals.

CONDITIONS/HAZARDS TO AVOID: None.

6. HAZARDS IDENTIFICATION**EFFECTS FROM ACUTE EXPOSURE:****INGESTION:**

Severe burns to mucous membranes of mouth, throat and digestive tract.

SKIN CONTACT:

Causes moderate skin irritation. Prolonged contact causes severe burns which may not be immediately painful or visible.

INHALATION:

Mists are irritating to mucous membranes, respiratory tract, and lung tissue. May cause damage to nasal and respiratory passages.

EYE CONTACT:

Causes severe eye irritation. Corrosive to eye tissue and may cause severe damage and blindness.

CHRONIC EFFECTS:

Dermatitis. Possible respiratory damage from inhalation of dust or mist.

EFFECTS/CARCINOGENICITY:

None listed under OSHA, IARC, or NTP.

ROUTES OF ENTRY:

SUPER LIME-SOL, Liquid Phosphoric Acid Foam Cleaner

Routes of entry for solids and liquids include eye and skin contact, ingestion and inhalation.

EMERGENCY AND FIRST AID MEASURES:

INGESTION: Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person. **SKIN:** Flush with water for at least 15 minutes while removing all contaminated clothing and shoes. Get medical attention if irritation persists. **INHALATION:** If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult. **EYES:** Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

NOTES TO PHYSICIAN: None.

7. HANDLING AND STORAGE

SPILL PROCEDURES:

SMALL SPILLS: Pick up with absorbant material. Flush residue with water.

LARGE SPILLS: Dike to contain. Pick up with absorbant material. Put in suitable container for disposal. Flush remainder with water.

WASTE DISPOSAL METHODS:

Dispose in accordance with Federal, State and Local regulations.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

DANGER: Concentrated acidic liquid. Avoid contact with eyes, skin and clothing. Store only in original container and keep closed. Store in a cool, dry area. Use in a well ventilated area to prevent irritation by vapors. Mix only with water. Do not reuse container. Follow label directions carefully.

OTHER PRECAUTIONS:

Keep out of reach of children.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE CONTROLS:

Showers. Eyewash stations.

RESPIRATORY PROTECTION:

None normally required. Use approved NIOSH respiratory protection if TLV exceeded or if over exposure is likely.

PROTECTIVE GLOVES:

Rubber or plastic gloves recommended to minimize skin contact.

EYE PROTECTION:

Goggles. Face shield.

OTHER PERSONAL PROTECTION

Rubber boots. Appropriate protective clothing as needed to prevent skin contact.

EQUIPMENT:

None required. General mechanical and/or local exhaust as needed if mist or vapors cause irritation.

Health and safety information presented on this form is generally applicable at recommended dilutions, varying only in degree. This information was compiled from current, reliable sources and is believed to be correct. As data, and/or regulations change, and conditions of use and handling are beyond our control, no warranty, express or implied, is made as to completeness or continuing accuracy of this information.

*** END OF MSDS ***

Normandeau Assoc.

Ref. No. 20122

June 25, 2004

Mr. Mark Krcmarik
The Dennis Group
1391 Main Street
Springfield, MA 01103

Re: Summary of the Hydrogeology of the South Deerfield-Whately, Massachusetts Area in Support of a Water Management Act Application for Chang and Son Enterprises.

Mr. Krcmarik:

This letter presents a summary of the hydrogeology of the South Deerfield-Whately, Massachusetts area in support of the Water Management Act (WMA) permit application that you are preparing for the Chang Farm (the site). In this letter report Normandeau provides an overview of the hydrogeology of the South Deerfield/Whately area and a summary of the publicly available information on water use in the vicinity of the site.

Information Sources

The principal sources of information on the hydrogeology of the study area included the United States Geological Survey (USGS) and the Commonwealth of Massachusetts. Copies of relevant reports were obtained from the Dimond Library at the University of New Hampshire, the Integrated Sciences & Engineering Library at the Lederle Graduate Research Center at the University of Massachusetts and directly from the Massachusetts Department of Environmental Protection (MADEP) and the USGS.

Site Location

The site is located in Whately, Massachusetts off of River Road and is approximately 1,500 feet south of the town line with South Deerfield, Massachusetts (Figure 1). The property is bordered by River Road to the east and agricultural lands to the north and south and undeveloped land to the west (Figure 2).

Hydrogeologic Setting

The hydrogeologic setting of the site reflects the interaction of both the underlying geology (surficial and bedrock) and the hydrology (surface and ground water) of the immediate region. As shown in Figure 1, the major surface water bodies near the site include Sugarloaf Brook and the Connecticut River. The Sugarloaf Brook drainage arises from the base of Mt. Sugarloaf, where the brook flows to the south-southwest and through South Deerfield and then southeast, passing just east of the site and then discharging to the Connecticut River (Figures 1 and 2). The Connecticut River is located approximately 1,300 feet due east of the site and flows from the northeast past the site and to the south-southeast.

The generation of surface runoff is dependent upon several factors including the amount of precipitation, land use, topography, soils and geology. Based on meteorological records available from the station located in Amherst, Massachusetts, for the period 1948 to 2002, the area receives 45.6 inches of precipitation annually. The precipitation is distributed fairly evenly throughout the year with the bulk of it in the form of rain during the spring (April) through the into the fall (October) followed by snow during the winter months (November through March). The greatest runoff occurs during the spring in response to snowmelt. The increased runoff due to snowmelt is documented in the streamflow records of the Mill River, which originates in the drainage basin northwest of the site. Records for the USGS gaging station (01171500), located on the Mill River in Northampton, show that the river discharge peaks in April and then declines slowly to its annual lows in August.

As shown in Figures 2 and 3, land use in the vicinity of the site is rural-agricultural with little impervious cover, thereby limiting the production of significant runoff and promoting ground water recharge. The only area of concentrated land development with significant impervious land cover is located northwest of the site in South Deerfield (Figure 1). The principal receptors of runoff produced in South Deerfield are Bloody Brook, a tributary to the Mill River, and Sugarloaf Brook with some recharge to ground water.

The topography of the area at and around the site is relatively flat and consists of floodplain, which borders the Connecticut River, and a higher river terrace west of the site (Figure 1). The site is located within the floodplain at an elevation of approximately 146 feet, with a maximum relief of less than three feet. West of the site, the land surface transitions from floodplain to river terrace with the top of the river terrace having an elevation of 197 feet and having less than 10

feet of relief. The flat nature of both the floodplain and the river terrace are conducive to infiltration of precipitation, thereby minimizing surface runoff.

The soils in the vicinity of the site have been mapped by the Soil Conservation Service (SCS, now known as the Natural Resource Conservation Service or NRCS) as the Hadley-Winooski-Limerick association, which are described as being poorly drained silty soils found on flood plains (Mott and Fuller, 1967). The soils underlying the site have been mapped as the Hadley very silty loam, which are described as being moderately permeable with slow runoff. West of the site and in the upper portion of the Sugarloaf Brook watershed the soils have been mapped as the Hinckley-Windsor-Merrimac association, which are described as being droughty and somewhat sandy gravelly soils (Mott and Fuller 1967).

The nature and characteristics of the soils found at the site reflect their development upon the surficial materials deposited in the Connecticut River valley, from both the river and during the last ice age. Based on the mapping by Jahns (1951), the site is located on recent floodplain deposits of silt and sand. These materials have accumulated on the floodplain surface over time as a result of the periodic flooding of the Connecticut River. These fine grain sediments (clay, silt and fine sand) along with some organics are highly productive and have been intensively cultivated for agricultural use.

The flat uplands west of the site are mapped by Jahns (1951) as consisting of bottom sand and clays that were deposited in glacial Lake Hitchcock. This lake formed during the retreat of the Wisconsin Ice sheet approximately 14,000 years ago (Skehan 2001). Melt water from the ice sheet and tributaries discharged into the lake depositing coarse material (sand and gravel) in deltas, while fine grain sediments (clay and silt) slowly accumulated along the sides and bottom of the lake. This lake was eventually breached and the Connecticut River and its tributaries now flow across the former lake bed.

The surficial deposits of the study area are underlain by bedrock that was deposited over 200 million years ago in the geologic structure known as the Deerfield Basin (Skehan 2001). Based on the mapping by Willard (1951) the bedrock underlying the site consists of undifferentiated Triassic age rock. Willard (1951) was unable to determine the specific bedrock type underlying this area because there are no outcrops (exposures) of it locally due to the presence of thick floodplain and lake bottom sediments. Most likely the site is underlain by the Sugarloaf

formation, which is exposed at the Mount Sugarloaf State Park north of the site. The Sugarloaf formation is also referred to as the Sugarloaf arkose, which Willard (1951) describes as consisting of "pebbles of granite few inches across set in a fine-grained matrix of feldspar and mica. The arkosic conglomerate is deeply stained by iron oxide, which gives it a brick-red color."

Ground Water Resources

The hydrogeology of the South Deerfield/Whately area and the potential for ground water development has been studied as part of both regional and local investigations performed by the USGS and the Commonwealth of Massachusetts. The earliest regional assessment was performed by the USGS in the 1960s (Cederstrom and Hodges 1967) followed by more detailed studies in the 1970s (Walker and Caswell 1977), 1980s (Frimpter 1980 and Hansen 1986) and the 1990s (Friesz 1996). The impetus for these investigations has been the rapid development of the Connecticut River valley, particularly around the Towns of Amherst and Northampton, which has resulted in increased water use. To respond to the increasing demand for water, these investigations were performed by the USGS to identify potential future water supply sources.

As mentioned in the discussion of the hydrogeologic setting of the site, the stratigraphy of the Connecticut River valley sediments includes the unconsolidated floodplain and former glacial lake deposits, which overlay the Sugarloaf arkose. Through a review of geologic information gathered from borings and wells drilled in the area, the USGS estimated the thickness of the unconsolidated material in the vicinity of the site ranges from 100 to 150 feet (Langer 1979) and principally consists of undifferentiated sand deposits (Stone and others 1979). Information on the stratigraphy and depth to bedrock at the site is available from the observations made during the drilling of a bedrock water well at the Chang Farm. According to Mr. Sidney Chang, the manager of the farm, the subsurface materials encountered during the drilling of the well included topsoil (0-2 feet), fine sands (2-30 feet), clay (30-400 feet) with bedrock at 400 feet. The fine sands are associated with the floodplain deposits while the thick sequence of clay is associated with the former glacial lake deposits.

Ground water has been encountered at the site in the floodplain sands and in the fractured bedrock. The presence of the unconfined aquifer in the floodplain sands is the result of the difference in the permeability between this unit and the underlying lake bottom deposits. The lake bottom deposits of silt and clay have a much lower permeability than the overlying sands

significantly reducing the vertical movement of the infiltrating precipitation. This decrease in permeability causes the infiltrating precipitation to perch above lake bottom deposits, which act as a lower confining boundary. The sources of the ground water in the unconfined aquifer include the infiltration of precipitation on site and the movement of ground water from the recharge zone upgradient of the site. Since unconfined ground water typically flows in the direction of the slope of the ground surface, the ground water recharge area is located west-northwest of the site and includes both the river terrace and the floodplain deposits within the Sugarloaf Brook watershed. The infiltration of surface water from Sugarloaf Brook as it crosses the floodplain sands may also represent a significant source of ground water recharge during the spring under high flow conditions. The shallow ground water then flows from the recharge area, below the site and to the east towards Sugarloaf Brook and the Connecticut River (Figure 1).

Studies by the USGS (Walker and Caswell 1977 and Frimpter 1980) have identified the floodplain deposits as a potential water supply source. Walker and Caswell (1977) estimated that the unconfined aquifer in the floodplain sands may be capable of producing up to 50 gallons per minute (gpm) of water. Frimpter (1980) estimated that the stratified sands in the terraces and floodplain can yield from 5-50 gpm to shallow wells or well points. He also noted that fields of wells in this aquifer "can supply enough water for municipal supply, as in South Deerfield, or for irrigation." The unconfined aquifer is presently used by the Chang Farm as its principal water supply. According to Mr. Sidney Chang, the depth to ground water under the site is typically 10 feet. Since the fine sand unit has a thickness of roughly 30 feet, its saturated thickness is roughly 20 feet. Ground water is extracted from the floodplain sands at the site from a series of shallow well points west of the production facility and from several well points within the production facility (Figure 2). The processing facility operates throughout the year and daily water use can exceed 100,000 gallons per day depending on the number of shallow well points pumped.

Several attempts to locate a high yielding sand and gravel aquifer in buried outwash deposits below the lake bottom clay unit have been performed in the area with little success. In 1986, a detailed study of the hydrogeology of the Amherst, Hadley and Sunderland areas was performed by the USGS. The findings of the study indicate that no areally extensive basal sand and gravel deposits exists beneath the study area although limited, irregularly distributed, buried sand and gravel deposits capable of providing large quantities of ground water are present and have been developed (Hansen 1986). Based on the subsurface materials encountered during the drilling of the bedrock well on site there is no evidence of a buried outwash deposit below the former lake deposits in this area.

The second major ground water aquifer at the site is fractured bedrock. Previous studies by the USGS (Walker and Caswell 1977 and Frimpter 1980) have identified the Triassic rocks, such as the Sugarloaf arkose, as potential water supply sources. Walker and Caswell (1977) estimate that the Triassic rocks found in the Connecticut River valley may yield from 10 to 100 gpm. They also note that the "water from the Triassic rocks is normally more mineralized than water from other aquifers in the study area and, in places, is unsatisfactory for domestic use because of hardness and high concentration of sulfate." Frimpter (1980) noted that for the sedimentary rocks underlying the area, they may be capable of yielding from 1 to 300 gpm to individual wells, but does not mention any water quality issues associated with this aquifer.

More recently, the USGS performed an analysis of the yields of bedrock wells in Massachusetts. As reported by Hansen and Simcox (1994), the median yield of bedrock wells completed in the sedimentary rock of the Connecticut Valley is 60 gpm with a median well depth of 342 feet. In their analysis they also note that the yield of wells completed in the sedimentary rocks of the Connecticut Valley increase with increasing well depth. This trend may be explained by the contribution of water from the rock mass along with the water from fractures.

As previously mentioned a bedrock well has been drilled at the Chang Farm. The depth to bedrock was 400 feet and the bottom of the well is 600 feet below grade. According to Mr. Sidney Chang this well produced over 30 gpm, but the water produced by the well was reportedly brackish and unsuitable for the processing operations at the farm. As a result the well was capped and is not utilized by the farm.

The location of other water supply wells in the vicinity of the site was investigated through a review of the MassGIS. Based on the records of MassGIS only one Zone II Wellhead Protection Area is located near the site. As shown in Figure 4, the Zone II Area for the South Deerfield Wellfield is located approximately 1,300 feet northwest of the Chang Farm wells. Based on the expected ground water flow direction, the Chang Farm wells are located downgradient of the Zone II Area. Smaller domestic or agricultural wells may also be present in the vicinity of the Chang Farm wells, but no publicly available information was available to confirm their location, construction or production.

Summary

This letter report provides an overview of the hydrogeology of the South Deerfield-Whately area and the ground water resources in the vicinity of the Chang Farm. The principal water supply source for the Chang Farm is a shallow unconfined aquifer that is composed of stratified sands that were deposited in the floodplain of the Connecticut River. This aquifer is perched on a thick sequence of silts and clays that were deposited in a former glacial lake that filled the Connecticut River valley following the last ice age. Recharge for the unconfined aquifer is derived from the infiltration of precipitation on site and from the movement of ground water from the recharge area located northwest of the site. Seasonally, shallow ground water may also be recharged by the infiltration of water from Sugarloaf Brook and it crosses the floodplain.

Based on the topography of the area it is expected that ground water flows from the river terraces northwest of the site and to the southeast toward the lower portion of Sugarloaf Brook and the Connecticut River. At the site, the depth to ground water is typically 10 feet and the saturated thickness of the unconfined aquifer is roughly 20 feet. During periods of higher than average recharge, as experienced during the late winter and early spring, the depth to ground water and the amount of ground water available for pumping increases. As recharge decreases during the summer due to increased evapotranspiration losses, the depth to ground water increases and the volume of ground water available for withdrawal decreases.

A series of shallow (less than 30 feet) well points have been installed in the unconfined aquifer at the site and they can reportedly produce over 100,000 gallons of water per day. Previous studies of the ground water resource potential of this area by the USGS indicated that the floodplain deposits can produce useable quantities of ground water and have been used by some communities and farms for their water supplies.

The second water supply source for the Chang Farm is a confined fractured bedrock aquifer. Fractured bedrock is located at a depth of 400 feet below grade and a bedrock supply well was drilled to a total depth of 600 feet in what is described as red mottled rock. The water produced from the well was reportedly brackish in nature and found to be unsuitable for use as food process water. The poor quality of the water produced from the sedimentary rocks in the Connecticut River valley has been previously noted in studies by the USGS.

Mr. Mark Krcmarik
June 25, 2004
Page 8

The only major ground water supply system identified in the vicinity of the site is the South Deerfield well field. The MADEP has approved a Zone II Wellhead Protection Area for this well field and whose boundary is located approximately 1,300 feet upgradient from the Chang Farm wells. Smaller domestic or agricultural wells may also be present in the vicinity of the Chang Farm wells, but no publicly available information was available to confirm their location, construction or production.

If you have any questions regarding this letter, please contact me at 472-5191 (ext. 172) or at alarson@normandeau.com.

Sincerely,
Normandeau Associates, Inc.

Al Larson
Principal Scientist

REFERENCES

- Cederstrom, D.J. and A.L. Hodges, Jr., 1967. Ground-Water Favorability of the Connecticut River Basin New England States. United States Geological Survey Hydrologic Investigations Atlas HA-249. Prepared in cooperation with the U.S. Army Corps of Engineers. Two sheets, scale 1: 250, 000.
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- Hansen, B.P. and A.C. Simcox, 1994. Yields of Bedrock Wells in Massachusetts. United States Geological Survey Water-Resources Investigations Report 93-4115. Prepared in cooperation with the Massachusetts Department of Environmental Management, Office of Water Resources. p. 43.
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- Langer, W.H., 1979. Map Showing Distribution and Thickness of the Principal Fine-Grained Deposits, Connecticut Valley Urban Area, Central New England. United States Geological Survey Miscellaneous Investigations Series Map I-1074-C. Two sheets, scale 1: 125,000.

Mott, J.R. and D.C. Fuller, 1967. Soil Survey of Franklin County, Massachusetts. United States Department of Agriculture in cooperation with the Massachusetts Agricultural Experiment Station. p. 204.

Skehan, J.W., 2001. Roadside Geology of Massachusetts. Mountain Press Publishing Company. p. 379.

Stone, J.R., London, E.H. and W.H. Langer, 1979. Map Showing Textures of Unconsolidated Materials, Connecticut Valley Urban Area, Central New England. United States Geological Survey Miscellaneous Investigation Series Map I-1074-B. Three sheets, scale 1: 125,000.

Walker, E.H. and W.W. Caswell, 1977. Map Showing Availability of Ground Water in the Connecticut River Lowlands, Massachusetts. United States Geological Survey Hydrologic Investigations Atlas HA-563. Prepared in cooperation with the Massachusetts Water Resources Commission. Two sheets, scale 1: 48,000.

Willard, M.E., 1951. Geologic Map of the Mount Toby Quadrangle, Massachusetts, Bedrock Geology. United States Geological Survey Geologic Quadrangle Map GQ-8. Scale 1: 31,680.

FIGURES



Figure 1 – Location of the Chang Farm, Whately, Massachusetts.



Figure 2. Aerial photograph of Chang Farm with shallow water wells and drilled well locations shown.

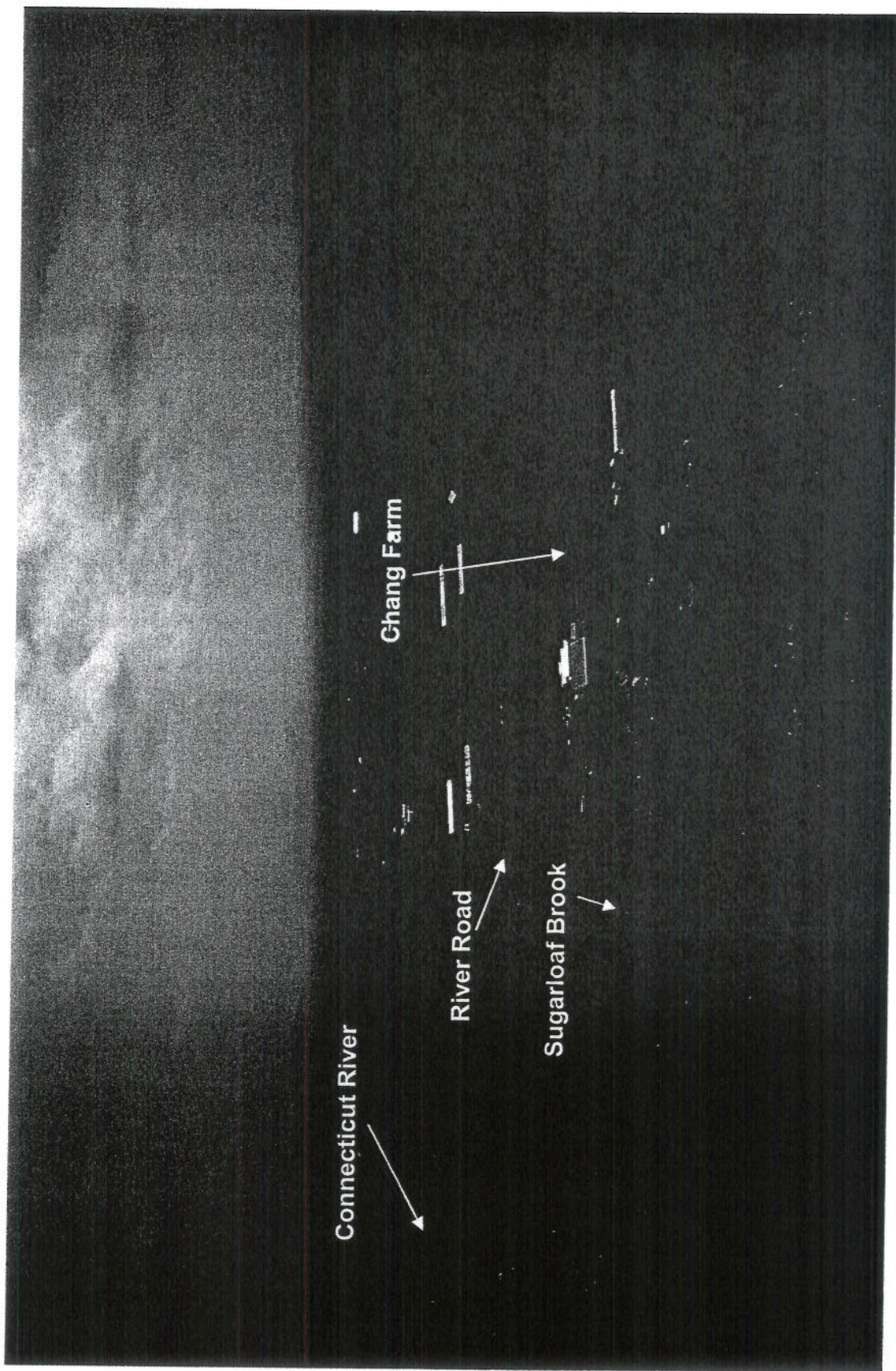


Figure 3. View of the Chang Farm, Sugarloaf Brook and the Connecticut River looking south from Sugarloaf Mountain.

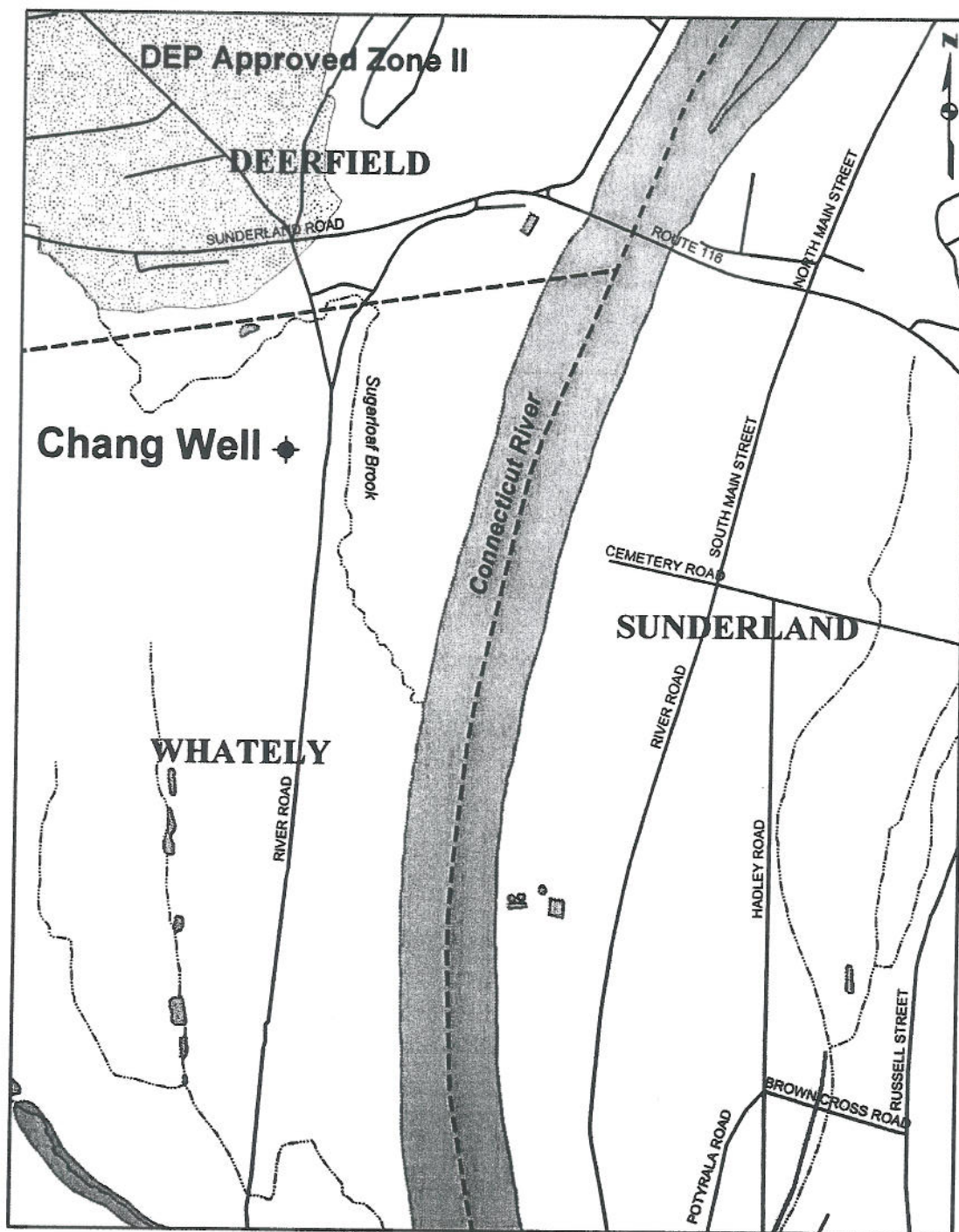


Figure 4: Location of Chang Farm Well and Deerfield Zone II Area

THE DENNIS GROUP, LLC

PLANNING ▲ ENGINEERING ▲ CONSTRUCTION MANAGEMENT

2 June 2004

Michael J. Gorski, Regional Director
Western Regional Office
436 Dwight Street
Springfield, MA 01103

RE: Chang and Sons Enterprises, Inc
415 River Road
South Deerfield, MA 01373

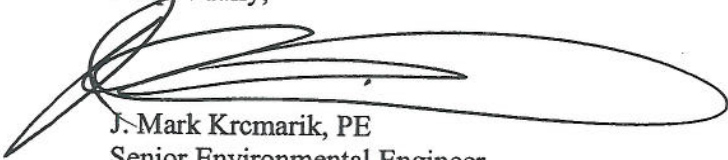
Ratification of Consent Order

Mr. Gorski:

Attached please find the signed Consent Order by Mr. Sidney Chang, Vice President of Chang Farms. The work comply with the Order is in progress. We will ask for a preliminary, meeting on the two permit applications prior to submittal to insure completeness.

Thank you.

Respectfully,



J. Mark Krcmarik, PE
Senior Environmental Engineer

Cc Sidney Chang, Chang Farms
Mark Schelweiss, MA DEP
Dan McCreary, DGI

1391 MAIN STREET
SPRINGFIELD, MASSACHUSETTS 01103
413.787.1785 • FAX 413.787.1786

1782 HAYDN DRIVE
CARDIFF BY THE SEA, CALIFORNIA 92007
760.230.1459 • FAX 760.230.1461

136 SOUTH MAIN STREET
SALT LAKE CITY, UTAH 84101
801.531.8585 • FAX 801.531.8586

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

In The Matter of:)

File No. ACO-WE-04-1G001-F

Chang and Son Enterprises:)

**ADMINISTRATIVE CONSENT ORDER
AND NOTICE OF NONCOMPLIANCE**

I. THE PARTIES

1. The Department of Environmental Protection ("the Department") is a duly constituted agency of the Commonwealth of Massachusetts established pursuant to G.L. c. 21A, § 7. The Department maintains its principal office at One Winter Street, Boston, Massachusetts 02108, and a regional office at 436 Dwight Street, Springfield, Massachusetts 01103.
2. Chang and Sons Enterprises, ("Respondent"), is a corporation doing business in Massachusetts with a business address at P.O. Box 191, 415 River Road, South Deerfield, MA 01373.

II. JURISDICTION

1. The Department is responsible for the implementation and enforcement of the Massachusetts Wetlands Protection Act, G.L. c. 131, § 40, and the regulations promulgated there under at 310 CMR 10.00 et seq., the Massachusetts Clean Water Act, G.L. c. 21, §§ 26-53 inclusive, and the regulations promulgated there

under at 314 CMR 1.00 – 12.00 et seq, G.L. c. 21G, the Water Management Act and related regulations at 310 CMR 36.00, and G.L. c. 111 § 160, the Public Water Supply statute and related regulations at 310 CMR 22.01 et seq. The Department has authority under G.L. c. 21A, §16, and the regulations promulgated thereunder at 310 CMR 5.00, to assess civil administrative penalties to persons in noncompliance with its regulations.

III. STATEMENT OF FACTS AND LAW

1. The United States Environmental Protection Agency (“USEPA”) and the Department under the authority of the Federal Clean Water Act, as amended and the Massachusetts Clean Waters Act, as amended, jointly issued Respondent a permit to discharge process/irrigation water from a Mung Bean Sprout farming operation in South Deerfield to Sugarloaf Brook. The permit was effective on September 30, 1985 and authorized the discharge for a period of five years from the date of issuance. The permit number is MA0028851 (the “Permit”).
2. By letter to USEPA from Respondent dated February 10, 1995 Respondent stated that they were no longer discharging to Sugarloaf Brook as they had redirected their discharge to the surface of the ground at their farm fields.
3. By letter to Respondent from USEPA dated March 10, 1995 USEPA stated that since Respondent was no longer discharging into any waters of the United States, USEPA would close out the National Discharge Elimination System (“NPDES”) permit (MA0028851).

4. Respondent discharges irrigation/process water containing applied nutrients, liquid acid equipment cleaners and sanitizers, liquid chlorinated alkaline foam cleaners, and liquid phosphoric acid foam cleaners.
5. The Department regulates the discharge of pollutants to the ground waters of the Commonwealth at 314 CMR 5.00.
6. The term "pollutant" is defined at 314 CMR 5.02 in part as:
"Any element or property of... agricultural... waste, runoff, heated effluent, or other matter, in whatever form... which is or may be discharged, drained or otherwise introduced into... waters of the Commonwealth."
7. Waters of the Commonwealth are defined at 314 CMR 5.02 to include, without limitation, ground waters.
8. The regulations at 314 CMR 5.03 define those discharges requiring a permit as:
"Activities which constitute discharges of pollutants requiring a permit... include, but are not limited to...any facility which discharges a liquid effluent onto or below the land surface."
9. Persons that withdraw greater than 9.0 million gallons within three consecutive months are required to obtain a permit prior to construction by the regulations at 310 CMR 36.00.
10. The Department has determined that Respondent has been withdrawing or intends to withdraw water volumes in excess of the permitting thresholds prescribed by the Water Management Act, G.L. c. 21G, and corresponding regulations, 310 CMR 36.00. The purpose of the withdrawal is agricultural.
11. Respondent does not have a permit for its water withdrawal.

12. The acts and omissions set forth above are violations of G.L. c. 21 §§ 26-53, G.L. c. 21G and the regulations promulgated there under at 314 CMR 5.00 and 310 CMR 36.00, respectively.

IV. DISPOSTION AND ORDER

1. As a result of discussions which have taken place between representatives of the Department and Respondent, and without adjudication of any fact or law set forth above, the parties have agreed to enter into this Order because it is in their own interests, and in the public interest, to proceed promptly with the actions called for herein rather than expend additional time and resources litigating the allegations set forth above.
2. For the reasons set forth above, the Department hereby issues, and Respondent hereby consents to, and admits that the Department has jurisdiction to issue, this Order.
3. This Order shall be binding on Respondent and on its officers, employees, agents, contractors, successors, heirs and assigns. Respondent shall not violate this Order and shall not allow its officers, employees, agents, contractors, successors, heirs, or assigns to violate this Order. Violation of this Order by any of the foregoing persons or entities shall constitute violation of this Order by Respondent. Respondent shall provide a copy of this Order to each successor and/or assign.
4. To address the violations identified in the Statement of Facts and Law above, Respondent shall perform the following actions:

- a. By no later than July 1, 2004 Respondent shall make a complete application to USEPA and the Department for a NPDES permit to discharge an effluent from Respondent's facilities to the Connecticut River.
- b. By no later than July 1, 2004 Respondent shall submit to the Department for review and approval a complete application for water withdrawal pursuant to 310 CMR 36.00.
- c. By no later than the date of execution of this Consent Order, Respondent shall sample its effluent in accordance with the following parameters shown in the table below and report the results of that sampling to the Department on a monthly basis by no later than the 10th day of the month following the sampling:

PARAMETER	SAMPLE TYPE	FREQUENCY
Fecal Coliform (col/100 ml)	Grab	1/week
Total Nitrogen (mg/l)	8 ²⁴ hour composite	1/week
Total Phosphorous (mg/l)	8 ²⁴ hour composite	1/week
Flow (gpd)	Total daily flow	Continuous
pH (std units)	Grab	Daily
BOD (mg/l)	8 ²⁴ hour composite	1/week
TSS (mg/l)	8 ²⁴ hour composite	1/week
Temperature (°F)	Grab	1/week
Total Residual Chlorine (ug/l)	Grab	1/week

- d. Respondent shall not increase the hydraulic flow of the discharge or the average concentration of the discharge beyond those limits reported in a document entitled:

CHANG FARMS, INC.
301 River Road
Whately, MA 01373
BUSINESS PLAN
REVISION 1
DECEMBER 22, 2003
PREPARED BY: The Dennis Group, LLC

- e. Respondent shall have no more than 120 days to complete construction of an effluent sewer and outfall to the Connecticut River after issuance of a new NPDES permit jointly issued by USEPA and the Department, Water Management Act permit issued by the Department, and all other necessary federal, state and local permits are issued.
5. All submittals, (other than penalty payments), required by this Consent Order shall be made in writing to:

Brian D. Harrington
Department of Environmental Protection
Western Region
436 Dwight Street
Springfield, MA 01103

6. The activities performed pursuant to this Order shall be performed in accordance with all applicable federal, state and local laws, regulations and approvals.
7. Respondent agrees to the imposition of a civil administrative penalty in the amount of Seven Thousand Five Hundred dollars (\$7,500.00) for the violations identified in the Statement of Facts and Law above. The Department agrees to suspend Seven Thousand Five Hundred dollars (\$7,500.00) of the penalty if

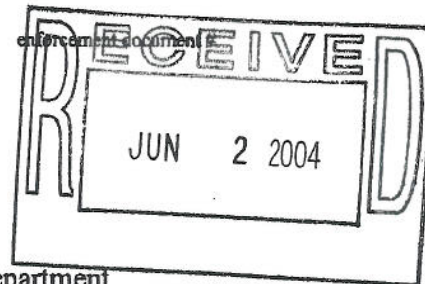
9. In the event Respondent fails to pay, in full, any civil administrative penalty due under this Order in the manner and form required by, and the date due by, this Order, Respondent shall pay to the Commonwealth up to three (3) times the amount of the civil administrative penalty, together with costs, plus interest on the balance due from the time such penalty became due, including all costs and reasonable attorneys' fees incurred in the collection thereof. The rate of interest shall be the rate set forth by G.L. c. 231, § 6C. Respondent shall not be deemed to have returned to compliance until Respondent pays all penalties due under this Order and performs the actions set forth in this Order.

V. ADDITIONAL TERMS AND CONDITIONS

1. This Order shall not be construed as, or operate as, relieving Respondent or any other person of the necessity of complying with all applicable federal, state and local laws and regulations.
2. Nothing in this Consent Order shall be construed or operate as barring, diminishing, adjudicating, or in any way affecting any legal or equitable right of the Department (i) to issue any future Order with respect to the subject matter covered by this Consent Order, or (ii) pursue any claim, action, suit, cause of action, or demand which the Department may have with respect to the subject matter covered by this Consent Order, including without limitation any action to enforce this Consent Order in an administrative, civil or criminal judicial proceeding.

3. In addition to being an Order, this instrument is also a Notice of Noncompliance issued pursuant to G.L. c. 21A, §16, and 310 CMR 5.00. The Department determines, and Respondent agrees, that the deadlines set forth above, constitute reasonable timeframes for coming into compliance.
4. Respondent hereby waives its right to an adjudicatory hearing before the Department on, and judicial review of, the issuance and terms of this Order and to notice of any such rights of review.
5. Respondent agrees to allow the Department, and the Department's employees, authorized representatives, and contractors, to enter the site at all reasonable times to inspect the site and any equipment and facilities located thereon; take samples, including but not limited to samples of any wastes, by-products, recovered materials or discharges; have access to and photocopy records; and verify that Respondent is satisfying the terms and conditions of this Order and the laws and regulations administered by the Department.
6. The provisions of this Order are severable, and if any provision of this Order, or the application thereof, is held invalid, such invalidity shall not affect the validity of other provisions of this Order, or the application of such other provisions, which can be given effect without the invalid provision or application; provided, however, that the Department shall have the discretion to void this Order in the event of any such invalidity.
7. This Consent Order may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

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**VI. RATIFICATION**

This CONSENT ORDER shall be effective on the date signed by the Department.

Consented To:**ORIGINAL**

I certify that I am duly authorized to enter into this Consent Order on behalf of,

Chang and Sons Enterprises, Inc.
P.O. Box 191
415 River Road, South Deerfield, MA 01373
(423) 665-3341

By: _____

Date: 6-1-04

Signature

Print Name

Title

Federal Employer Identification Number
042763852

Issued By:**DEPARTMENT OF ENVIRONMENTAL PROTECTION**

Hereunto duly authorized,

By: _____

Date: _____

Michael J. Gorski, Regional Director
Western Regional Office
436 Dwight Street
Springfield, MA 01103
Telephone: (413) 784-1100